Intergovernmental Oceanographic Commission

Workshop Report No. 36

IOC/FAO Workshop on Improved Uses of Research Vessels

organized with the support of NORAD

Lisbon, 28 May - 2 June 1984

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IOC Workshop Reports

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No.	Title	Publishing Body	Languages
1	CCOP-IOC, 1974, Metallogenesis, Hydrocarbons and Tectonic Patterns in Eastern Asia (Report of the IDOE Workshop on); Bangkok, Thailand 24-29 September 1973 UNDP (CCOP), 138 pp.	Office of the Project Manager UNDP/CCOP c/o ESCAP Sala Santitham Bangkok 2, Thailand	English
2	CICAR Ichthyoplankton Workshop, Mexico City, 16-27 July 1974 (Unesco Technical Paper in Marine Sciences, No. 20).	Division of Marine Sciences, Unesco Place de Fontenoy 75700 Paris, France	English (out of stock) Spanish (out of stock)
3	Report of the IOC/GFCM/ICSEM International Workshop on Marine Pollution in the Mediterranean, Monte Carlo, 9-14 September 1974.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English French Spanish (out of stock)
4	Report of the Workshop on the Phenomenon known as "El Niño", Guayaquil, Ecuador, 4-12 December 1974.	FAO Via delle Terme di Caracalla 00100 Rome, Italy	English (out of stock) Spanish (out of stock)
5	IDOE International Workshop on Marine Geology and Geophysics of the Caribbean Region and its Resources, Kingston, Jamaica, 17-22 February 1975.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English (out of stock) Spanish
6	Report of the CCOP/SOPAC-IOC IDOE International Workshop on Geology, Mineral Resources and Geophysics of the South Pacific, Suva, Fiji, 1-6 September 1975.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English
7	Report of the Scientific Workshop to Initiate Planning for a Co-operative Investigation in the North and Central Western Indian Ocean, organized within the IDOE under the sponsorship of IOC/FAO (IOFC)/Unesco/EAC, Nairobi, Kenya, 25 March-2 April 1976.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English French Spanish Russian
8	Joint IOC/FAO (IPFC)/UNEP International Workshop on Marine Pollution in East Asian Waters, Penang, 7-13 April 1976.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English (out of stock)
9	IOC/CMG/SCOR Second International Workshop on Marine Geoscience, Mauritius, 9-13 August 1976.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English French Spanish Russian
10	IOC/WMO Second Workshop on Marine Pollution (Petroleum) Monitoring, Monaco, 14-18 June 1976.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English French Spanish (out of stock) Russian
11	Report of the IOC/FAO/UNEP International Workshop on Marine Pollution in the Caribbean and Adjacent Regions, Port of Spain Trinidad, 13-17 December 1976.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English Spanish (out of stock)
11 Suppl.	Collected contributions of invited lecturers and authors to the IOC/FAO/UNEP International Workshop on Marine Pollution in the Caribbean and Adjacent Regions, Port of Spain, Trinidad, 13-17 December 1976.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English Spanish
12	Report of the IOCARIBE Interdisciplinary Workshop on Scientific Programmes in Support of Fisheries Projects, Fort-de-France, Martinique 28 November-2 December 1977.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English French Spanish
13	Report of the IOCARIBE Workshop on Environmental Geology of the Caribbean Coastal Area, Port of Spain, Trinidad, 16-18 January 1978.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English Spanish
14	IOC/FAO/WHO/UNEP International Workshop on Marine Pollution in the Gulf of Guinea and Adjacent Areas, Abidjan, Ivory Coast, 2-9 May 1978.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English French
15	CPPS/FAO/IOC/UNEP International Workshop on Marine Pollution in the South-East Pacific, Santiago de Chile, 6-10 November 1978.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English (out of stock)
16	Workshop on the Western Pacific, Tokyo, 19-20 February 1979.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English French Russian
17	Joint IOC/WMO Workshop on Oceanographic Products and the IGOSS Data Processing and Services System (IDPSS), Moscow, 9-11 April 1979.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English
17 Suppl.	Papers submitted to the Joint IOC/WMO Seminar on Oceanographic Products and the IGOSS Data Processing and Services System, Moscow, 2-6 April 1979.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English
18	IOC/Unesco Workshop on Syllabus for Training Marine Technicians, Miami, 22-26 May 1978 (Unesco reports in marine sciences, No. 4)	Division of Marine Sciences, Unesco Place de Fontenoy 75700 Paris, France	English French Spanish Russian
19	IOC Workshop on Marine Science Syllabus for Secondary Schools, Llantwit Major, Wales, U.K., 5-9 June 1978 (Unesco reports in marine sciences, No. 5).	Division of Marine Sciences, Unesco Place de Fontenoy 75700 Paris, France	English French Spanish Russian Arabic
20	Second CCOP-IOC Workshop on IDOE Studies of East Asia Tectonics and Resources, Bandung, Indonesia, 17-21 October 1978.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English
21	Second IDOE Symposium on Turbulence in the Ocean, Liège, Belgium, 7-18 May 1979.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English French Spanish Russian
22	Third IOC/WMO Workshop on Marine Pollution Monitoring, New Delhi, 11-15 February 1980.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English French Spanish Russian
23	WESTPAC Workshop on the Marine Geology and Geophysics of the North-West Pacific, Tokyo, 27-31 March 1980.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English Russian
24	WESTPAC Workshop on Coastal Transport of Pollutants, Tokyo, 27-31 March 1980.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English (out of stock)
25	Workshop on the Intercalibration of Sampling Procedures of the IOC/WMO UNEP Pilot Project on Monitoring Background Levels of Selected Pollutants in Open-Ocean Waters, Bermuda, 11-26 January 1980.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English (superseded by IOC Technical Series No. 22)
26	IOC Workshop on Coastal Area Management in the Caribbean Region, Mexico City, 24 September-5 October 1979.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English Spanish
27	CCOP/SOPAC-IOC Second International Workshop on Geology, Mineral Resources and Geophysics of the South Pacific, Nouméa, New Caledonia, 9-15 October 1980.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English
28	FAO/IOC Workshop on the effects of environmental variation on the survival of larval pelagic fishes Lima, 20 April-5 May 1980.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English
29	WESTPAC Workshop on Marine biological methodology Tokyo, 9-14 February 1981.	IOC, Unesco Place de Fontenoy 75700 Paris, France	English
30	International Workshop on Marine Pollution in the South-West Atlantic Montevideo, 10-14 November 1980.	IOC, Unesco Place de Fontenoy, 75700 Paris, France	English (out of stock) Spanish
31	Third International Workshop on Marine Geoscience Heidelberg, 19-24 July 1982	IOC, Unesco Place de Fontenoy 75700 Paris, France	English French Spanish
32	UNU/IOC/Unesco Workshop on International Co-operation in the Development of Marine Science and the Transfer of Technology in the context of the New Ocean Regime Paris, 27 September - 1 October 1982	IOC, Unesco Place de Fontenoy 75700 Paris, France	English French Spanish

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A Supplement to the Report containing selected papers presented at the Workshop will be published in due course.

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Marine science and ocean services depend, to a considerable extent, on the availability of research vessels. Many countries, conscious of the importance of marine scientific research for their national development, have recently acquired oceanographic research vessels, sometimes through donation from industrialised countries under bilateral co-operative agreements. While this trend in the developing countries to acquire new research vessels seems to be on the increase, it is, nevertheless, posing serious problems of a tchnological nature to those countries in the maintenance and management of these vessels.

Several factors (such as maintenance, cruise planning, personnel management, etc.) seem to hamper the effective use of research vessels, especially in developing countries, thereby seriously impairing the prospects for future research and hence for socio-economic development through the rational use of ocean space. Consequently, this subject has been receiving attention in various IOC fora and in the IOC Member States in an attempt to find an appropriate solution to the problems.

For instance, the IOC Programme Group for the Co-operative Investigation of the North and Central Western Indian Ocean (CINCWIO), at its First Session (Kenya, 4-9 October 1982), considered the use of research vessels and platfoms, and analysed the problem confronting many countries of the region in the utilisation of research vessels. By decision IOCINWIO 1.9, the Programme Group requested the Secretary of IOC, in collaboration with FAO, to arrange for an evaluation of those existing research vessels that could be offered for research work on a co-operative basis in a national and regional context.

Similarly, the IOC Workshop on Regional Co-operation in Marine Science in the Central Eastern Atlantic (Tenerife, Spain, 12 - 17 December, 1983) considered the subject at some length. Two main kinds of problems were evoked: the high cost of acquiring a specialised oceanographic research vessel; and the great difficulty and cost of maintaining and operating such a vessel. Nevertheless, these problems are not the only ones confronting developing countries in this field. Other questions have been raised on the use of vessels in the study of distant-water oceanography and on the possible co-operative use of such vessels in the context of regional and global marine scientific investigations. It therefore appeared logical to examine carefully all facets of the use of research vessels.

The IOC, jointly with FAO, and with the support of the Norwegian Agency for International Development (NORAD), therefore organized a Workshop on the Improved Uses of Research Vessels in Lisbon, Portugal, 28 May - 2 June 1984, with the following objectives:

(i) to review the existing situation confronting countries in the use of research vessels and to identify common problems that need to be resolved;

(ii) to advise on ways and means for ensuring effective uses of research vessels to meet national and regional/subregional needs including through sharing or common use of research vessels and their adequate management, and

(iii) to consider the role of international co-operation and assistance in enhancing the use of research vessels as well as provision of ship-time in the context of co-operative marine research programmes.

The present Report contains the proceedings of this Workshop, as well as an annex with models of national co-ordination of research vessels and the planning of research cruises, as practised by selected countries. The full text of selected background papers at the Workshop will be published in due course as a Supplement to the present Workshop Report.

1. OPENING OF THE WORKSHOP

The Secretary of the Intergovernmental Oceanographic Commission (IOC), Dr. Mario Ruivo, in his opening address, drew the attention of the participants to the important contemporary developments in recent years in ocean affairs and related research, which led to the idea of organizing this Workshop on the Improved Uses of Research Vessels. He recalled that the new ocean regime which resulted from the negotiations and signature by a large number of States of the UN Convention on the Law of the Sea, had created a situation where self-reliance in marine science and technology was needed to ensure that countries were in a position to exercise their new rights to explore and exploit marine resources in areas under national jurisdiction, to derive socio-economic benefits from them, and to fulfil related obligations. He pointed out that a number of Articles of the Convention on the Law of the Sea referred to the need for conservation of marine resources and protection of the marine environment on the basis of scientific findings. In the case of many developing countries, he commented, the achievement of that objective was beset with numerous scientific and technology problems. Although modern technological development made it possible to use sophisticated equipment such as satellites, drifting buoys, and other platforms for the study of the sea, the deployment of a research vessel still remains the most important tool.

While a number of countries, especially among the developing ones, were rapidly acquiring research vessels to respond to their emerging needs, the rising costs of fuel and equipment, coupled with the difficulty to repair, and to provide for the effective management and maintenance of the vessels, were rapidly becoming major obstacles to the fulfillment of national goals in marine affairs.

Aside from basic problems, the Secretary of the IOC went on to say, a number of questions were raised in various regional subsidiary bodies of the Commission which relate to the need to optimize the use of research vessels and the related need for better co-ordinating mechanisms that could ensure their optimum utilization at the national and regional levels. He said that the idea of having an in-depth analysis of the problems confronting the users of research vessels in a forum of experts from different parts of the world was considered timely. The proposal later received due encouragement and support from the Norwegian Agency for International Development (NORAD). The purpose of this Workshop, which is the first of its kind, was to review the state of affairs and to propose a set of guidelines on improved use of research vessels based on exchange of personal experiences. The

Workshop would also be invited to recommend measures that should allow the Commission, under its programme for TEMA, and in collaboration with FAO, to satisfy the emerging needs of Member States. He said this would also allow future consultations with NORAD and other international sources of funding to assist the Commission implementing those recommendations jointly with FAO.

The Secretary of IOC expressed his sincere thanks to the Government of Portugal for hosting the Workshop, to FAO for co-sponsoring it and to NORAD for the support provided.

The participants in the Workshop were welcomed, on behalf of the Portuguese Authorities, by Vice-Admiral J. Barahona Fernandez, Chairman of the Permanent Commission on Oceanology of the National Agency for Scientific and Technological Research (JNICT) of Portugal. He expressed his deep appreciation for the initiative taken by IOC, FAO and NORAD in organizing this Workshop on a subject which, in recent years, had gained considerable prominence among the maritime nations. He reiterated that despite development of sophisticated technology for the study of the oceans, the research vessel continued to enjoy a unique status in the exploration of the sea and its resources. One of

the major problems confronting many countries, including Portugal, he said, was decision-making in the selection and acquisition of the right type and size of research vessel and/or of alternatives that would allow countries to meet their short-and long-term needs.

Admiral Barahora Fernandez also observed that a significant number of countries had recently experienced problems in the management, maintenance and repair of research vessels as a result of the complex and sophisticated nature of oceanographic equipment. He commented that for countries which could not afford big and modern research vessels, a small size and intermediate technology could probably prove a better alternative for acquisition of the required oceanographic data and for the execution of many basic projects essential to their development. He laid considerable emphasis on the need for developing an effective co-ordinating mechanism to meet the emerging needs of institutions and universities at the national level and to enable countries to become involved in regional co-operative ventures, particularly in the extended area of the Exclusive Economic Zone and other marine areas under national jurisdiction. He hoped that the Workshop would undertake a thorough and in-depth analysis of the problems facing the developing countries in effective utilization of research vessels and would succeed in recommending measures and guidelines that would enable them to overcome those issues.

2. ADMINISTRATIVE ARRANGEMENTS FOR THE WORKSHOP

2.1 ELECTION OF CHAIRMAN AND VICE-CHAIRMAN

Mr. Odd Nakken of Norway was designated as Chairman and Dr. H.N. Siddique of India as Vice-Chairman of the Workshop.

2.2 RAPPORTEUR

Mr. John Cleverly of the United Kingdom was designated Rapporteur.

2.3 WORKING ARRANGEMENTS FOR THE WORKSHOP

Dr. S.M. Haq, Assistant Secretary IOC and IOC Technical Secretary for the Workshop, presented the Provisional Agenda, Time-table and List of Documents as well as available Information Papers prepared by the participants. Mr. J. Fitzpatrick, from the Department of Fisheries of FAO, served as FAO Technical Secretary for the Workshop. Mr. R. Aertgeerts, IOC Consultant, served as IOC Assistant Technical Secretary for the Workshop.

3. REVIEW OF CONSTRAINTS TO THE EFFECTIVE USE OF RESEARCH VESSELS

The Document entitled "Basic Requirements (i.e. size, type) for Research Vessels and Shipboard Equipment for Marine Scientific Research" was introduced by Mr. J.O. Traung, IOC Consultant. It provides information on general maritime equipment needed on board research vessels, such as positioning and navigation devices, winches, computers etc. Reference is made to instruments required for carrying out shipboard observations in scientific fields such as fisheries biology; physical, chemical and biological oceanography; marine geology and geophysics. The possible use of other vessels for carrying out specific types of scientific research is examined, and examples are cited of service-type government vessels, such as oil protection ships or ice breakers, being utilized as research vessels.

As to the management of the vessels, it is pointed out that several countries have special mechanisms to co-ordinate vessels operations from various organizations. In such a case, normal cruise programmes are reported and lists of available time are sent out in advance to potential users so that the institutions and individual scientists could apply for participation.

On the utilization of research vessels for scientific studies, due importance is given to their value in terms of both acquisition and operation cost. The cost of research vessels depends not only on the size but also to a great extent on the equipment components and the country of their construction. For instance, the cost of a research vessel, 21.1 m in length, built in 1983, is quoted as NK 9 millions (=

US$ 1.2 millions) while that of a vessel 56 metres in length built in 1984, is US$ 9.6 million. Similarly, a replacement value of a 29 metre long research vessel built in 1968, was quoted in 1983 for the same specification, at a price ranging from US$2,500,000 to US$ 3,400,000.

For a research vessel, a total coverage of 200 days per year is considered normal. The proportion of running costs to the investment costs was considered higher for the smaller vessels than in the case of the larger ones. Running costs were stipulated as being approximately US$ 8,500 per day at sea for a fully crewed 500GT vessel, scientists included. With 200 days at sea this resulted in an annual operational cost of US$ 1.7 million.

The longer the ship is used the more cost-effective the operation is likely to be, although the total cost of operation in real terms would be greater for 300 sea days per year as against 200 days per year.

After the presentation of the background information, a general discussion on various points raised in the papers followed.

It was stressed that marine research should be identified as an integral component of a long term national development plan in order to ensure continued support. Several alternatives for the execution of marine research shall then be examined and the most economic option be selected. Such alternatives include ship acquisition, chartering, activation and adoption, sub-contracting of research programmes, and co-operative arrangements on a bilateral or multilateral basis.

Participants felt that in many developing countries acquisition of research vessels is usually not preceeded by proper long-term planning of scientific programmes. They considered that such planning should not be limited to an estimation of the quantity of work to be performed, but that it should also take the necessary institutional support into consideration, including the availability of skilled scientific and technical manpower.

The "Interim Results from Questionnaires on Research Vessels and Requirements" were introduced by Mr. J. Fitzpatrick, the FAO Technical Secretary for the Workshop. He presented to the Workshop the preliminary analysis of responses to the Joint Questionnaires issued by FAO/IOC on the geographical distribution of research vessels, the needs of countries for additional research vessel time, and the availability of vessels for service by other parties than the owner/operator. An Addendum No. 1 was also presented to illustrate that the total number of research vessels, recorded as a result of the Questionnaire, fell short of the numbers of research vessels above 15 m in length on record with other registration societies bodies. The FAO/IOC Questionnaire sought to identify vessels by length, power, age and principal use and at the same time to obtain information on whether or or not suitable vessels could be released by their owners for work elsewhere. The responses to the Questionnaire had been reasonably useful from the

point of view of collecting technical data. They had been favourable in identifying a suitable number of vessels available for use by other parties than the owner, and had highlighted the needs of a number of countries for additional research vessel services. Although the requirements for additional assistance would appear to be greater than the available services, it was too early to draw conclusions. This was partly due to some of the potential donors wishing to discuss the needs of other countries on a bilateral basis. In some cases, there was obviously a reluctance on the part of the owners of the vessels, which responded to the FAO/IOC Questionnaires to make what might be seen as a commitment.

Mr. R. Aertgeerts, IOC Assistant Technical Secretary for the Workshop presented an analysis of the replies received to the IOC Questionnaire on Improved Uses of Research Vessels. These replies provided by individual specialists in their personal capacity, covered one hundred and twelve ships in twenty countries.

In order to facilitate compilation of the Questionnaire, it had been decided to arbitrarily categorize ships into the following size groups I: < 15 m; II 20 - 30 m; III 35 - 40 m; IV 45 - 50 m; V > 70 m.

Data provided showed that, while industrialized countries still possess the bulk of the ocean-going capacity, developing countries have undertaken a significant effort in recent years in the acquisition of marine research vessels.

Operation costs are mainly composed of fuel, crew salaries and maintenance. Fuel accounts for about 22% of the operational costs in industrialized countries, but increased to about 26% of operational costs in developing countries.

Remuneration of crews is generally higher in the merchant marine with an especially significant difference in favour of the higher echelons than in the merchant marine in developing countries.

Maintenance was often identified as being a problem, particularly with regard to maintenance of advanced electronic equipment. Several countries use aditional facilities such as those of the navy, commercial firms, etc.

The number of sea days effectively tallied by industrialized and developing nations is essentially comparable in vessels of the lower size classes. However, in the higher size classes a significant difference in number of sea days appears between developing and industrialized countries in favour of the latter.

Cruises are mostly undertaken within the two hundred mile EEZ and the maritime areas under national jurisdiction of the country that owns the research vessel. Nevertheless, most countries have had the possibility to undertake open ocean or deep sea research well outside their national two hundred mile EEZ and other waters within the national jurisdiction.

Ships are utilized for both training and research. Training is mostly oriented towards nationals of the country that own the vessel. Research is undertaken in all fields of traditional marine research by all developing nations, but some form of specialization seems to have taken place in the industrialized nations.

Scientific research cruises are generally planned one year in advance, but guidelines for the development of cruise plans seem to be established only on an institutional basis. Once cruise plans have been formulated, official proposals are generally submitted for approval to different national bodies. These differ according to the institutional affiliation of the home institute of the research vessels. An example of a rather complete procedure for the development of cruise plans was made available to the participants, courtesy of the French Centre National pour l'Exploitation des Oceans (CNEXO).

The problem of designating a cruise leader was solved in different ways in different countries, but in general the cruise leader had to be a staff member of the home institute of the research vessel.

Joint cruises between ship-owning and other institutes would usually appear to be possible, but nationally integrated planning is generally desired.

Data on future ship-time required, indicate a preference for medium size vessels in the developing countries and higher category vessels in industrialized nations.

A paper on "UNDP/FAO Fisheries Vessel Pool", presented by Mr. J. Fitzpatrick, contained an inventory of sixty-eight fishing vessels assigned by UNDP to its fisheries development projects. A fisheries vessel pool was established in 1973 in order to optimize the utilization of these vessels and to administer their use on a world-wide basis. The vessels from this pool have rendered services to more than forty countries, at an affordable cost to projects, and have thus justified their existence. However due to age and obsolence, many vessels have been phased out of service and as a result, UNDP and FAO are contemplating new measures designed to maintain the high levels of vessels' services available under the vessel pool agreement with developing countries.

Many participants felt that the information brought forth in the documents presented to the Workshop was important, but that a thorough analysis was required of the various facets attached to the effective utilization of research vessels. Factors hampering their effective use identified by the Workshop included inadequate advance cruise planning and deficient institutional arrangements for financing and utilizing both ship and equipment. The management of research vessels was considered a complex issue, embracing several aspects which needed to be handled carefully. Examples hereof include manpower requirements, proper definition of duties and availability of spare parts.

Assessment of cruise performance was considered essential to ensure effective development of programme planning. Several factors were considered important for the operation and maintence of vessels. These include personnel management, provision of incentives to scientific staff, officers and crew and, utilization patterns of research vessels. Some participants also emphasized the importance of international co-operation in promoting co-operative use of research vessels and the role of donor countries in assisting developing countries in acquiring research vessels.

4. PLANNING AND DECISION-MAKING PROBLEMS IN RESEARCH VESSEL ACQUISITION

Several participants had submitted background papers in which they reviewed the different aspects that need to be considered when acquiring a new vessel.

A first prerequisite must be an expressed national policy for marine research over a long time period. One way to achieve this goal should be to include marine research in national long-term development planning. Only in such a way can adequate funding over longer periods be guaranteed.

It is necessary to be aware that several options exist for the execution of marine research at sea. For example, many countries have started their marine research programmes, not through the acquisition of vessels but through co-operative arrangements with their national navy. While the present trend in oceanographic and fishery research puts ever-increasing demands on vessel equipment, such kind of internal co-operative arrangements should not be discarded off-hand by countries starting in the area of marine research. Other possibilities include acquisition of ship-time on a vessel run by another country and different forms of multilateral and bilateral co-operation.

When the decision is taken to acquire a research vessel, several factors need to be taken into consideration to achieve the best selection. Common mistakes include the purchase of discarded military vessels and the acquisition of vessels that are too small or inadequate for the work at hand, or too large for the budget nationally available for the proposed marine scientific research.

Obsolete vessels offered to institutions may often demand an excessive effort to assure basic maintenance and operational capability. Some vessels, particularly reconverted navy vessels, offer only limited deck space and power supplies, so that modern oceanographic research equipment cannot be fitted easily on board.

The choice of a smaller vessel is often based on the lower acquisition and presumed lower operating costs. It has however been noted in many areas that while operational costs do not increase proportionally with the size of the vessel, efficiency does increase with size. The interest shown in using a vessel is also in direct relation to the size. The result is often that, in spite of somewhat higher operating costs, it is easier to obtain funds for a larger vessel than for a smaller one. This is true up to a certain size, beyond which the size of the vessel far exceeds the capability of the country to operate it.

A special case where research vessel acquisition can lead to serious problems is the uncritical acceptance of research vessels offered by a donor country. Such vessels are often of a design suited to the conditions of the donor country, but may not be well adapted for the ones of the recipient country.

Various participants stressed the need for the recipient country to devote adequate effort to the preparation for the uses and operation of the research vessel. This can be illustrated with the example of the Universidad Nacional Autonoma de Mexico (UNAM). When the University decided to acquire a vessel, the following points were considered;

a) the scientific staff had reached a level that could sustain its academic continuity;

b) the existence of proper installations and equipment;

c) the importance of the ocean and its resources, particularly in the historic moment in which a new international ocean regime is emerging;

d) the great potential which represents for Mexico the continental shelf and the Exclusive Economic Zone;

e) the need to explore the Mexican seas with the purpose of employing marine sciences and technology as effective tools of development.

The UNAM decision to obtain a vessel led to the conclusion of a long-term agreement between three national institutions, UNAM, CONACyT (National Science and Technology Council) and PEMEX (the Mexican Oil Company), for the systematic exploitation of the Mexican Exclusive Economic Zone.

Long-term goals for the marine scientific programme of the country should be identified as part of the process of acquiring new vessels. These programmes must be based on the fact that, given adequate maintenance, ships now have an average useful life of about 20 years. For this period due consideration should be given to the availability of spares, maintenance facilities and funds.

While this was yet another argument in favour of long-term planning, some participants felt that developing countries might have serious difficulties in establishing long-term marine scientific programmes due to a variety of factors such as lack of scientific manpower and institutional arrangements. They therefore recommended that long-term research plans should be based on declared national priorities and should address only well-defined scientific objectives. Implementation of the plan should be co-ordinated, directed and verified by an appropriate national institution. Execution of the approved research plan should be enstrusted to individual institutes or scientists within their recognized area of competence.

Regarding preparation by the recipient country, several participants stressed the need to provide sufficient and well-qualified manpower on a long-term basis for the operation of research vessels, as well as for the analysis and interpretation of the information, data and samples collected.

One way to reduce the problems encountered by developing countries in the acquisition of research vessels would be to draw on the experience of other countries and international organizations such as IOC and FAO. The advice provided by Unesco in the acquisition of a research vessel for the University of Qatar was taken as a case in point.

The Workshop therefore concluded that:

i) the decision to acquire a research vessel should be based on a long-term national plan;

ii) selection of vessels must be a careful process by both users and owners;

iii) countries must undertake significant efforts to assure optimal functioning of the research vessel by ensuring adequate manpower and necessary funding, for example by showing a wide national interest in her use.

5. CRUISE PLANNING AND RELATED INSTITUTIONAL ARRANGEMENTS

A number of participants described how cruise plans are organized in their respective countries. Procedures involved in initial planning of a cruise vary considerably depending on ownership of a research vessel and prevailing institutional arrangements. In most cases, cruise planning is part of an overall strategy approved for carrying out agreed programmes of scientific investigation. The procedure is generally simple when the owner, operator and scientific users are an institution.

The Norwegian Institute of Marine Sciences is a case in point. The Institute operates four vessels funded by the Government and follows a fixed time-table for planning research cruises. Each September/October, research programmes of the Institute for the next year are drawn up. The relevant scientific and technical staff revises the long-term cruise plan. In October/November cruise proposals for the following year are formulated. By November, a draft cruise programme is submitted and the tasks and priorities are discussed among the scientific staff. By December, cruise staffing is decided upon. The final cruise plan is made by the cruise leader 14 days to a month before the cruise starts. All stages of planning are completed within the Institution through mutual consultation among units concerned.

In the case of India, the National Institute of Oceanography (NIO), Goa, is an autonomous body under the Council of Scientific and Industrial Research. The NIO and the Department of Ocean Development own two research vessels. The operation of research vessels is carried out by the Shipping Corporation of India. Cruise programmes are proposed initially at the NIO and subsequently discussed at a workshop of the participating organizations. Interests of all the participating organizations are considered by various Working Groups. The Working Groups at the Inter-Agency Workshops provide a useful forum for scientists of similar and different disciplines and create links between the institutional and interdisciplinary programmes. The programme drawn up at the workshop is placed before the Cruise Planning and Programme Priorities Committee for Research Vessels for review and approval.

The Fishery Survey of India, on the other hand, is a Governmental organization and is the national agency for fishery resources assessments. It owns and operates independently a fleet of ten vessels of 250-350 ton size. The methodology adopted for cruise planning is stated to be more or less identical to the model that exists in Norway.

In the case of Mexico, oceanographic cruises are carried out through a consortium of national institutions. The National University of Mexico (UNAM) is the owner and operator of the research vessels. The crew are university employees, and the cost of operation is shared equally between CONACyT (National Council of Science and Technology), PEMEX (National Oil Company) and UNAM itself. The cruise programme of the R/V"El Puma" and the R/V "Justo Sierra" include activities proposed by UNAM, PEMEX, and CONACyT. The cruise programmes of UNAM are included in its programme and budget. The cruises of PEMEX, particularly those of exploratory and environmental type, are supported by funds of this agency. In addition, CONACyT receives requests for shiptime and or support from different institutions in Mexico. These are incorporated into the integral programme of operation of the respective research vessels.

In Japan, several agencies are involved in marine research activities. Each agency has its own arrangements and plans for research cruises and their implementation. The procedures used at the Ocean Research Institute (University of Tokyo) were discussed in detail. The Institute prepares a three-year plan for research cruises for large research vessels through a symposium. Cruise arrangements for small vessels are made on a yearly basis, two years prior to their implementation. Proposals for actual cruises against priority and approved programmes are invited from scientists by November and are submitted to the Advisory Body for Cruise Planning by early February. A final decision taken by the Board of the Ocean Research Institute is communicated to the Cruise Leaders by March, just before the fiscal year.

In China, the proposal for a cruise plan is submitted by interested institutions to the National Bureau of Oceanography (NBO) which is the central co-ordinating and funding body in China. The NBO, through its sub-bureau, is responsible for the implementation of this plan after its approval.

In the United Kingdom, the Natural Environmental Research Council (NERC) is the main organization responsible for providing support to marine research programmes at the Universities and other organizations. Planning is based on a three year rolling cycle. Cruises are programmed one year in advance. The Research Vessel Strategy Committee identifies research priorities three years ahead of project applications. Applications from research organizations are assessed on their sceintific merit and allotted priority gradings by various Review Committees. These are then passed to Marine Planning to compile costeffective and logistically acceptable ship programmes for NERC Council approval. The Chief Scientist is responsible for the

formulation and implementation of the programme. The Chief Scientist of each cruise is required to consult with marine staff, operation centres and scientific units of the research vessel services for drawing up a cruise plan.

In the United States planning and scheduling for the 27 ship fleet devoted to academic research programme is co-ordinated through the University-National Oceanographic Laboratory System (UNOLS). UNOLS is a non-government federation of eighteen universities and institutions who conduct marine research programmes and operate the ships in the UNOLS fleet. Cruises are firmly planned and scheduled one year in advance, within a strategic planning schedule of three years. Schedules for cruises in national waters (or near operating bases) are generally formulated about seven months in advance, while operational schedules for foreign waters or to remote high-seas areas are broadly planned 2-3 years in advance with final schedules about 12 months in advance. Academic research programmes are funded by Federal agencies (about two thirds from the National Science Foundation, the remainder from the Office of Naval Research and other agencies) on the basis of proposals to conduct scientific investigations. Each proposal specifies its requirements for ship use. After review by scientific peers, the government agencies decide to fund or reject proposals, and the sum of these decisions determines the content of the research fleet programme.

In France, the main organization responsible for the management and programmation of the oceanographic fleet is the CNEXO. A Consultative Committee for Planning (CCP) is an integral part of the Scientific Committee of CNEXO and consists of representatives from all interested parties. It receives proposals for scientific investigation at sea from all scientific institutions. Each requesting institution indicates its own priorities: the CCP takes into consideration the national and individual priorities, and also considers proposals for and constraints in international co-operation. All detailed proposals including scientific and technical workplans, information required, fixed or portable equipment and instrumentation including submersibles, are presented according to a standardised "Guide des Operations Navales". This guide has been distributed and presented to the participants in the Workshop. CCP selects prepared plans based on the provided information and submits them to CNEXO for integration to logistic and ship-time constraints.

Organization of the USSR Academy of Sciences' marine expeditions is being carried out in accordance with the approved plan. Institutes-shipowners formulate annually plans for scientific cruises.

These plans are considered by the USSR Academy of Sciences' Commission for the World Ocean Investigations Problems from the point of view of their technical and financial feasibility. The Commission is represented by the most competent scientists in various disciplines. The Commission makes some corrections to the plans and gives them to the Presidium of the Academy for approval. Institutes-shipowners are given necessary financial support for realization of their scientific cruise plans.

In Portugal ships are operated independently by the Hydrographic Institute of the Navy and the National Institute for Fisheries Research. Other Government Agencies, Universities or scientists interested in marine research put forward their requests through the Standing Committee on Oceanology which will assess their needs and establish priorities. Use of shiptime will then be co-ordinated directly by the institutes involved, based on the availability of ship-time for the Operating Agencies. Until recently ship-time was available free-of-charge from the first of these Institutes. Presently, the users will have to pay for daily operating costs.

A special case for the operation and planning of R/V "Dr. Fridtjof Nansen" was discussed in detail. This is a fisheries research vessel operating on a global basis under the auspices of FAO, NORAD, and Institute of Marine Research in Bergen. Due to its world-wide activities which involve surveys in the EEZ and other waters within the national jurisdiction, the planning of research cruises for the R/V "Dr. Fridtjof Nansen" is done two years in advance.

The Workshop, having reviewed the example of cruise planning and supportive institutional arrangements provided by a number of participants, concluded that:

i) timely, phased planning of the annual activity of research vessels is essential to allow for the provision of adequate funding, equipment, procurement and other support;

ii) an important consideration in cruise planning is to balance the scientific needs of the user community with the ship's facilities. Consultations between Chief Scientist, the ship's staff and the support services are crucial for the successful implementation of the scientific programme;

iii) co-ordinating institutional arrangements are essential to ensure the effective utilization of research vessels by the scientific community and to optimize national efforts in promoting marine research.

6. MANAGEMENT AND MONITORING OF CRUISES

Constraints to effective use of research vessels experienced by some operators, as identified in the summary of the results of the Questionnaire presented under item 3 above, were discussed by the Workshop under this item on the agenda.

Basic medium and long-term planning of cruises is influenced in many cases by the need to overcome labour problems. Such problems are diverse, generally varying in accordance with the degree of development of the commercial sector and living standards within the country of the operator.

In particular, many of the participants from developed countries are forced to consider a variety of watch systems for officers and crew and the need to make special arrangements for scientists.

Cost-effectiveness, related to officers and crew, proved to be of major concern in a number of cases and Norway favoured a 2-watch system (6 hours on, 6 hours off) in this respect, arguing that sea time and productivity at sea improved and that crews could obtain the greatest benefits from such a system. In the same way, although flexibility in assigning scientists to watches had to be maintained, similar benefits accruing to the scientists ensure the competitiveness of the operators of research vessels in competition with the commercial sector.

Notwithstanding the attraction of the 2-watch system, many countries operated 3 watches for officers and crew and national regulations, the requirements of labour unions and, indeed, the culture of the country might limit the choice of watch system by the operator. Nevertheless, the Workshop agreed that the best use has to be made of the skilled human resources available to the operator, particularly in developing countries.

Related to the watch systems, the Workshop noted a need to carry out certain tasks of a difficult or dangerous nature at a time during the day when the crew and scientists could be expected to be alert. Similarly, it was agreed that potentially dangerous work should only be allocated to crew, scientists and others on board having the necessary training; fishing operation, given as an example, should not be carried out by the scientists or others on board lacking the necessary training or experience.

The Workshop noted that the operators in most developed countries have the means at their disposal to overcome cruise management problems when their vessel or vessels operated within their own extended zones of jurisdiction, but, when operating in areas under the jurisdiction of another state, the need to obtain permission requires long-term planning and reduces the flexibility in revising cruise schedules, which is often needed when facing other problems, machinery defects and so on.

Such permission has usually to be obtained through diplomatic channels and the procedures are no less flexible for international agencies, such as the FAO. In this connection, the Workshop noted that with an increase in co-operation in research at sea, it is highly desirable for IOC to consider ways and means to facilitate implementation of the procedures and reduce the period of time taken to obtain operational permits.

Also to be taken into consideration in operating in extended zones of jurisdiction of other states is the appointment of observers by the host country and many countries gave examples of problems experienced. In some instances the lack of a common working language is often a drawback and it is not always possible for the host country to place observers on board who have a scientific background or a direct interest in the work being carried out.

The Workshop was unanimous in its preference for the integration of the observer into the scientific work programme, whenever it is possible to do so, to the benefit of the host country, as well as that of the individual.

Effective cruise planning implies discipline by the managers prior to and during the cruise. Most of the well organized institutions have "users manuals" which set out the responsibilities of the officers, crew and scientific staff. House rules are also included, spelling out codes of conduct, reports required and logs to be kept. Such manuals may be distinct from "standing orders" or other statutory requirements relating to the respective roles of the master of the vessel and the cruise leader.

However, some oprators in developing countries do experience difficulty in interpretation of the respective roles of the master and the cruise leader; this is often further complicated when the master, cruise leader and other key personnel on board are not of the same nationality or cultural background.

The guidance of the Workshop on this matter was clear and precise. The master of the vessel is responsible to the legal authority of the flag state for the safety of the vessel, the crew and all those on board. He or she is also duty bound to observe the regulations of the flag state and conventions to which the flag state is a signatory whilst navigating or in port. However, in consequence of the purpose for which the research vessel is intended, the "cruise leader" has the responsibility to ensure that the scientific programme for the cruise is carried out. Therefore, the master of the vessel must assist the cruise leader at all times to carry out the programme whilst taking into consideration the direct responsibility for the vessel and crew as explained above. Both the master and the cruise leader are responsible for the briefing of the crew and scientific staff respectively on the responsibility of the others and the objectives of the cruise.

The Workshop noted the necessity to brief newly-appointed masters and cruise leaders in their respective roles and this is the responsibility of pre-cruise management team/owners.

Another constraint discussed by the Workshop was the mobilization of essential scientific equipment and back-up spares. This problem proved to be acute in many developing countries and is dealt with elsewhere in this report in greater detail. Nevertheless, the issue is important enough to warrant further mention.

A research vessel without the proper equipment, whether fixed or mobile, serves no purpose except perhaps to give general sea training which is anything but cost-effective. For this reason, careful consideration should be given by all operators to the initial selection process, service facilities and ready accessibility to a source of spare parts, training of technicians and the provision of an adequate budget for maintenance and replacement of capital equipment.

Developing countries experience problem under each of the four categories mentioned in the paragraph above, of which the allocation of funds in "convertible currencies" often takes precedence.

Regarding the possible means to overcome the problems the Workshop formulated and endorsed the following suggestions:

i) In the case of vessels or equipment given as a donation by one country to another, careful consideration should be given by the donor at the selection/acquisition stage to standardize and to purchase only proven equipment and only after investigation of after-sales service in or near to the recipient. At the same time,

both the donor and the recipient must consider how the costs of routine maintenance and background can be met, budgets should be established and allocations of funds should be made to meet both local costs and the cost of imports.

ii) The recipient country should also make every effort to mobilize national technical capabilities within their own nation but outside their own research programme. Although the use of such national technical capabilities may entail significant cost to the marine research programme, it can often provide a more effective solution to technical problems of equipment acquisition, operation, maintenance and repair than would the use of technical capabilities from another nation. Alliances among several research and technology programmes within one small national offer specific advantages of broadening the available technological capability, of making intense technical training feasible, economies of pooled test equipment, etc. Candidate technological allies include university departments in chemistry, physics, biology, geology and engineering, technical government agencies and a broad sector of commercial technology;

iii) Training in the use and maintenance of equipment, with special reference to sophisticated scientific instrumentation, should be given high priority.

iv) Pooling of equipment (a system used to good effect by many operators) could be introduced on a national basis and, in certain cases, such arrangements might also be feasible between adjacent countries.

v) The creation of a pool of equipment/instrumentation, together with a highly trained team of technicians to be deployed on a worldwide basis to the benefit of developing countries, might be given further consideration by both bilateral and multilateral organizations. In this connection, the Workshop was informed on the proposal of the FAO to the Government of Norway regarding long-term training programmes in the maintenance and use of acoustic equipment for identification and estimation of the size of living resources in the extended zones of jurisdiction of developing countries.

vi) Due to common needs of many of the developing countries in particular, the IOC should consider convening a Workshop for the co-ordination, acquisition and maintenance of equipment, at which due consideration should be given to the setting of acceptable and proven standards.

Irrespective of the problems enumerated above, both developed and developing countries identified the basic need to monitor and evaluate cruises and users of the vessels, that is the scientific team on board, must be made aware of the need for making effective use of the allocated sea time.

Standard forms of record/log keeping should be employed, as well as a standard format for cruise reports. Some of the participants illustrated their system, which included mandatory requirements for daily reporting, the submission of a summary report by the scientist in charge immediately after the vessel returned from a cruise; a second more complete report to be sent to the foreign state within one month if the cruise or part of the cruise was carried out in the area or zones of jurisdiction of another country and a third , full and final scientific report to be submitted within 9-12 months of the conclusion of the cruise. In some cases, the reports also form part of the operators/owners evaluation system and, if the procedures have not been adhered to and quality of work maintained, the user might not be able to justify further sea time.

Evaluation of the utilization proved to be an important issue and the model submitted to the Workshop by China, entitled "The Development and Level of Utlization of the Research Fleet in China" was agreed to be a thought-provoking exercise worthy of further consideration. However, most countries, conscious of the need to be cost-effective, appeared to apply less exacting formulae for evaluation with ship days at sea, the quantity and quality of scientific observations being important; in certain cases, costs related to institutional support were apportioned and linked to the costs of operation of the vessel for evaluation purposes.

It was generally agreed that it would be difficult to set universal standards to measure the efficiency of research ships and that these were not readily compared to the operation of ships in the commercial sector. However, the need to maximize the use of available time at sea by efficient preparation for cruises, effective cruise plans, co-operation at sea between scientists and crew, good reporting and dissemination of reports must be constantly monitored and evaluated. Discipline should also be encouraged where possible, one such example being given in the paragraph on reporting the result of cruises.

7. OPERATION AND MAINTENANCE OF VESSELS, INCLUDING SUPPORT FACILITIES

In the summary of the results of Questionnaires presented under section 3 above, constraints to be overcome in order to increase the effective use of sea time of research vessels were noted in such areas as fleet management, the maintenance and repair of vessels and where less than adequate support facilities exist.

The Workshop noted that good ship management is essential and that lines of communication between the "user" and the "operator" should be as direct as possible. This fact also emerged from a study of the information papers submitted by a number of participants.

Some of the participants, in both developed and developing countries, had experience of maintaining a ship management team within their general management structure and explained the benefits of the close relationship between the scientific groups, the ships' crews and ships' managers, all under central control, simplifying communications and giving a better understanding of each other's problems.

Other participants, for various reasons, adopted different methods in order to ensure effective ship management, embracing selection and recruitment of crews, maintenance and the procurement of spare parts and generally ensuring that a given vessel is ready to carry out the duties required of it.

One method employed, and explained in detail to the Workshop, is to arrange with government shipping corporation or private shipping companies to take over the full responsibility for ship management. Thus an owner/ operator takes advantage of an existing and experienced team of managers, marine and engineer superintendents.

Another system in operation in some countries is to leave the crewing and ship operation to the military navy. This had advantages of discipline but had a number of drawbacks such as a tendency to overman and to appoint officers and crews for limited periods of time, thus leading to a lack of continuity.

In the case mentioned in the paragraphs above, the costs to the operator could be less than might be the case if "Ships' Management Units" have to be created directly by the operator or if a commercial ships' management company is contracted to do the work. Each case,

however, was thought to require individual evaluation since many factors, such as the number of vessels to be managed, governmental structures and local conditions would have to be considered.

The Workshop noted that, in addition to the point made in the paragraphs above, the power to make decisions and the attendant responsibilities for the effective use of research ships should be with those in charge and responsible for the scientific activities.

No matter which of the ship management systems is selected, the need for a well-structured maintenance programme is essential if a ship is to fulfil its function within the overall scientific programme. Therefore, scheduled downtime for drydocking and other forms of maintenance, for the servicing of a ship between cruises with fuel and provisions, replacement of scientific equipment or even crew changes, was considered by the Workshop to be a necessary part of cruise planning.

Being aware of the need for maintenance programmes for which support facilities and a ready supply of spare parts and expertise are required, some participants of developing countries put forward a number of constraints faced by them. Suitable docking facilities are not always available within the area of normal operation, they have difficulties in obtaining services, acquiring convertible currencies and negotiating suitable arrangements with owners of repair facilities outside of the home country. The need for such financial arrangements are often no different in many cases to the problems related to specialized equipment referred to above.

Technical supervision of repairs and maintenance is also a problem due to lack of experienced personnel in some cases and, in particular, with operators from emerging or developing countries faced with having to do their own ship management. The Workshop noted some solutions, including the use of classification society surveyors under the special "specification service" offered by the major societies. This can be costly and can only be of use if a surveyor is based relatively near the base of the vessel and if authority is delegated to the surveyor to act for the operator and make decisions on repairs. This service is not to be confused with building to class and maintaining in class as mentioned below. The specification service is available to any operators under a separate contract, which sets out the type of work to be done, the timing of inspections and the fee. The appointed surveyor acts on behalf of the owners and, although an exclusive surveyor of the society, he does not carry out surveys for classification purposes on a vessel for which he is the owners' representative.

Maintenance, however, should already be a consideration at the specification stage in ship procurement procedures and even for small vessels the rules for construction developed by the major classification societies and national institutions should preferably be followed. For larger ships, being built for States which are signatories to international conventions, such as the IMO Convention on Safety of Life at Sea, it would be mandatory to follow specific rules if the vessel under construction fell within the scope of the Convention.

It was noted that by following such rules of construction, operators are assured of a minimum acceptable international standard which, together with a well-prepared technical specification and careful selection of equipment (for standardization reasons or compatibility of service facilities in the area of operation) could provide a base upon which a sound preventive maintenance programme could be established. By maintaining a ship in class, the operator is required to carry out regular maintenance which, if properly carried out at the intervals dictated by societies, should reduce downtime. However, although the surveyor attends to the periodic surveys, he does not replace nor does he duplicate the work of the operators' marine and engineer superintendents and he does not represent the owners.

Another advantage of having a vessel "in class" was the probability of attracting competitive insurance premiums on the open market, which is an important factor for some operators; in addition, the higher standard of maintenance makes it easier for operators to prepare the ship for annual surveys required by many states in the interest of safety. This may also inspire confidence in the scientists, officers and crew on board.

Stock control of spares and equipment was seen as an essential component of programmed maintenance, not only in support of reducing down time but also in identifying the level of funding required over a number of years, the latter being an important item to some countries with a need to apply to the relevant authorities for the allocation of convertible currencies to meet the cost of imports.

The Workshop noted from the various information papers presented and from the discussions that some developing countries are in need of assistance in setting up ship management systems for ship operations and maintenance. For this, training of personnel would be required, as well as, in some cases, the identification of operational funding and the Workshop recommended IOC and FAO to investigate the possibility of assisting developing countries to obtain spare parts on a long-term basis.

8. IMPROVEMENT OF SEA GOING CONDITIONS FOR PERSONNEL AND EQUIPMENT

Problems related to the operation and maintenance of research vessels dealt with under this agenda item by the Workshop relate in the main to the ship, cruise salaries and conditions on board and that these are matters of concern to most of the participants.

Salaries and incentives, although varying greatly between highly industrialized countries and countries with less developed economies, pose common problems to many of the participants. All participants agreed on the need to maintain a fair level of compensation for service at sea for officers, crew, scientists and technicians, bearing in mind local conditions and the institutional framework of the operator.

Basic salaries for officers and crew are generally controlled by labour unions and/or governments. Some operators reported that special efforts have to be made to provide additional incentives to attract and maintain good officers and crew. Arrangements such as the introduction of the 2-watch system mentioned above, which means longer working hours when at sea, has the attraction of good salaries and a significant amount of paid leave, both of which are powerful incentives.

Other incentives for officers and crew varied from the payment of the sea allowance, overtime for hours worked in excess of an agreed number of hours to be worked per week, the free issue of clothing and free food or food allowance. The participant of the People's Republic of China mentioned that in his country sea allowances for crew and scientists serving in vessels operating in distant waters (waters beyond the island chain) are higher than for those serving in vessels operating in near waters (inside the island chain).

In case where vessels were managed and crewed by govenment corporation or private owners, crew salaries and conditions of service were reported to be in line with the national merchant marine. Thus attracting officers and crew to research vessels did not relate to salaries and conditions of service. Similarly, research vessels officered and crewed by military navies did not create the same problems of competition with the commercial sector as reported above.

There are also problems to be faced when there is a high demand for technicians, especially in areas of expanding commercial activities, and the salaries, sea-going incentives and conditions of service have to be kept under review.

The Workshop agreed that for officers, crew and scientists of research vessels, the total compensation accruing to them for time spent at sea, should be equal to and if possible exceed local rates. It was noted by the Workshop that universities, for example, might set different standards against which service on board by scientific staff may be judged, due to the varying degree of qualifications, experience and the value of the sea time to the scientific personnel concerned. It was also agreed that consideration should be given to the length of cruises and arduous of hazardous work when considering supplementary benefits.

Comfort on board was also noted by the Workshop to be worthy of special consideration and when building or refitting a ship the following chart, as introduced by Mr. J.O. Traung, could be used as a guide:

COMFORT	Hull configuration	Size and space distribution (position of working places) Lenght X Breadth X Depth (Stability, time of rolling and pitching) Anti-movement devices (fins, bulbs, flume tanks, anti-seasickness medicines) Semi submersibles (new hull types) Noise and vibration limitation (choice of machinery)
	Accommodation	Cabins (e.g. single) Messroom (e.g. windows) Position in ship Laboratories Entertainment facilities (video, TV, hi-fi, radio, library) Recreation facilities (gymnasium)
	Environment	Food (precooked or freshly cooked) Airconditioning Heating Shelter while working Medical attention Housekeeping

ILO and IMO have rules and guidelines for accommodation and other facilities to be made available on board and these should be followed as minimum requirements. However, in making life on board a research vessel attractive, comparisons should also be made with the facilities offered in the commercial sector. Comments made in this connection were:

i) equal accommodation for masters and cruise leaders;

ii) single cabin (a possibility if a 2-watch system is used due to smaller crews);

iii) cabins to the ship's side with windows and the placing of cabins for scientists in the most comfortable part of the ship from the point of view of minimizing seasickness;

iv) messrooms to have windows;

v) off-watch entertainment and recreational facilities, and

vi) improved medical facilities.

The need for comfortable working conditions was also stressed. This included the provision of sheltered deck areas, the placement of scientific equipment in comfortable locations, and the use of anti-rolling devices both to aid general comfort, and to make working conditions safer. The reduction of noise levels on board, which is currently under review by IMO, and vibration were also considered to be worth pursuing.

The Workshop appreciated that food, both in quality and quantity played an important role in the contentment of all on board and that imagination in presentation and variety should be kept in mind especially on long voyages. It was also noted that special consideration should be given to providing foreign participants or observers with food as compatible as possible with their normal diet.

In general the Workshop considered remuneration and comfort to be an important aspect in the management of research vessels and that conditions on board should be arranged, for the scientists in particular, to allow them to settle quickly in their work programme in order to make the best use of their time spent at sea. This includes data sampling processing and analysis, and evaluation of results. In general it is believed to be important that people, especially scientists, can do what they are really trained for.

9. INTERNATIONAL CO-OPERATION

The Secretary of IOC, opening the discussion, referred to the fact that many marine phenomena and problems extend beyond geographical regions and therefore research in marine sciences has been a traditional area of collaboration. He referred to the highly successful large-scale co-operative marine science programmes of the IOC as the International Indian Ocean Expedition (IIOE), the co-operative investigation of the Caribbean and Adjacent Regions (CICAR), the co-operative investigation of Kuroshio (CSK) in which a number of countries and vessels have participated. In these programmes, the major contributions came from the developed countries. The developing countries at that time had very little capacity to participate but an important exercise was undertaken under those programmes i.e. the ship-board training of scientists from developing countries. As a special case of international co-operation among countries, the Secretary of IOC also referred to the case of the Deep-Sea Drilling Project (DSDP) where the countries and scientists concerned are participating in collecting basic data of great scientific value.

He mentioned that Member States of IOC have been providing ship-board training for scientists from developing countries in which the host country provides the facilities, board and lodging to the trainee and IOC the necessary travel and subsistence. In such cases, IOC requires at least 9 months' time for notification and selection of names and forwarding them to the host country.

The Secretary of the IOC further referred to the experience gained during the UNDP/FAO ship-board training programme on board USSR research vessels, and to the recent USSR ship-board training programme organized in support of the geological and geophysical studies of the Mediterranean. Under the latter programme, scientists from coastal states in the Mediterranean participate in ship-board programmes and, after completion of the cruise, are awarded a fellowship by the Unesco Division of Marine Sciences to enable them to participate in the analysis of data in the USSR. He also informed the meeting of the ship-board training provided recently on Japanese research vessels in support of WESTPAC.

The Secretary of IOC went on to say that the situation now is changing with the establishment of EEZs and other marine areas under the national jurisdiction. As the new ocean regime takes effect, co-operation in the study of many ocean phenomena is expected to increase. As example, he referred to the IOCARIBE where scientists from the countries from the region are jointly planning a programme of scientific investigation on-board a Mexican research ship.

The Chairman, Mr. Odd Nakken, further emphasized the point that establishment of EEZs had led to greater co-operation (through the International Council for the Exploration of the Sea-ICES) in the North Sea Area and with the USSR in oceanographic studies, especially those relating to fish stocks.

A number of participants expressed their country's involvement in bilateral co-operative programmes. The participants from Cuba and Mexico declared their co-perative programmes with other countries both bilaterally and in a regional context, through IOCARIBE. The participants from India indicated their on-going bilateral programmes with Sri Lanka and the Seychelles, their proposed programmes with Mauritius, and referred to the assistance they have received from Canada, Norway, and the Federal Republic of Germany. The USSR participants indicated their co-operative programmes in Africa and the Caribbean, especially Cuba. Reference was made to the long-term bilateral programme between Japan and France and the French projected plans for co-operation with countries in the Red Sea and the Gulf of Aden through the IOC. The United States has bilateral agreements for oceanogrphic research with France, Japan and China. Long-term bilateral programmes were also carried out by the Federal Republic of Germany in Latin America (especially Peru) and South East Asia.

Portugal drew the attention to the existing bilateral co-operation with most of the African Portuguese-speaking countries, both with regard to local training and the provision of scholarships and technical advice. Scientific cruises have also been carried out in Guinea Bissau and Cape Verde.

Some participants proposed that international organizations explore possibilities of ship time with donor countries to use this facility in scientific investigations and training activities. The question was also raised how multilateral use of ship time could be made possible. It was proposed that such a matter could possibly be handled in a package deal through the regional bodies of the Commission whose Member States are responsible for the development and implementation of mutually agreed co-operative programmes and have already started the implementation of some of these programmes.

Participants from France, referring to the preceding cruise planning example, stated that co-operative cruises should imply prior clear objectives and co-operative programmes. It was then proposed that the IOC should play a role in gathering pertinent information on the needs and wishes of developing countries to build up co-operative programmes.

The emphasis was placed on the point that the definition of scientific programmes should in any event precede any dialogue on the subject of international co-operation.

Participants from India indicated their on going co-operative programmes with Sri Lanka, Seychelles and Kenya and the proposed programme with Mauritius and the assistance the country has received from Canada, Norway, Federal Republic of Germany and Denmark.

The participants recognized that there is a diversty of international co-operation under bilateral and multilateral arrangements. The Workshop recognized that co-operation in the use of research vessels is an important element and therefore recommended that:

i) IOC and FAO, upon the request of Member States, should provide advice on selection of required research vessels and on matters related to their management and institutional arrangements;

ii) IOC and FAO should assist countries in the development of schemes for the co-operative use of research vessels;

iii) IOC explores the possibility of obtaining ship-time from donor countries through a package deal for well-defined programmes. If a developing country is under economic pressure, assistance should be provided by international organizations under multilateral arrangements;

iv) IOC and FAO should encourage Member States, through their programmes, to plan joint cruises between the developing and developed countries. However, well-defined scientific cruise plans are a prerequisite for such an exercise.

v) Interested institutions should submit a package proposal to IOC/FAO in order to implement plans and seek assistance such as consultant service to guide on questions of management and operation of research vessels and to develop arrangements between developed and developing countries for repair and maintenance of research vessels.

10. ADOPTION OF THE REPORT

The Workshop adopted the Summary Report unanimously and gave editorial license to the Chairman, Vice-Chairman and Rapporteur to finalize it with the assistance of the IOC and FAO Secretariats.

The Workshop furthermore recommended that its Report be published by IOC in its Workshop Series in two parts: the Summary Report proper, and a Supplement containing selected papers presented at the Workshop.

The Workshop also unanimously adopted the major recommendations presented in Annex II.

11. CLOSURE OF THE SESSION

The Vice-Chairman, in the absence of the Chairman, expressed his great satisfaction with the successful outcome of the Session. He thanked all Delegates for their valuable suggestions and co-operation, and congratulated them for having arrived at such important conclusions.

On behalf of IOC and FAO, he expressed his special thanks to the Portuguese authority, local organizing committee, for the excellent arrangements made for the conduct of the meeting, and for looking after all local arrangements for the Delegates during their stay in Lisbon.

He informed the meeting that the outcome of the Workshop would be brought to the consideration of the Fourth Session of the Working Committee for Training, Education and Mutual Assistance (TEMA), from which guidance would be sought for the practical implementation of the Recommendation of the Workshop.

ANNEX I

AGENDA

1. OPENING

2. ADMINISTRATIVE ARRANGEMENTS

3. REQUIREMENTS FOR RESEARCH VESSELS AND EQUIPMENT FOR VARIOUS SCIENTIFIC DISCIPLINES AND CONDITIONS

4. ANALYSIS OF MAIN PROBLEM AREAS

5. INTERNATIONAL ARRANGEMENTS AND CO-OPERATION

6. CONCLUSIONS

7. ADOPTION OF THE REPORT

8. CLOSURE OF THE WORKSHOP

ANNEX II

RECOMMENDATION 1

GUIDE ON OPERATION AND MANAGEMENT OF RESEARCH VESSELS

The Workshop recommends, in light of the review made of the utilization of research vessels and of factors hampering their use, particularly by developing countries, and in view of the rich experience accumulated in many countries which operate research vessels and fleets, and in order to facilitate access to such experience and thus contribute to overcoming the difficulties identified in this field, that IOC and FAO prepare, with the assistance of consultants, a guide on the Operation and Management of Research Vessels to be complemented by selected case studies and models extracted from the documentation submitted to the Workshop and from the FAO publications on the management and use of fisheries research vessels, or available elsewhere.

RECOMMENDATION 2

REGIONAL/SUB-REGIONAL TRAINING COURSES ON RESEARCH FLEET MANAGEMENT AND CRUISE PLANNING

The Workshop recommends with a view to accelerating the training of personnel from developing counties and other countries faced with a similar need, the Workshop recommends that IOC and FAO organize in the coming years regional/sub-regional Training Courses on:

(i) operation and management of research vessels; and

(ii) planning of cruises, both of which could, using the Guide proposed under Recommendation 1, make full use of practical and simulation exercises.

The Workshop requested that IOC and FAO mobilize the extra- budgetary funds required for the preparation of the Guide and the organization of the Training Courses, and appeals to donor agencies such as NORAD to assist with the implementation of this project.

RECOMMENDATION 3

MECHANISMS FOR CRUISE PLANNING AND CO-ORDINATION OF SHIP-TIME

The Workshop noted that part of the difficulties with which some developing countries are confronted in the decision-making process for the construction of acquisition of a research vessel and its efficient utilization at national level, result to a certain degree from inadequate institutional arrangements and procedures.

The Workshop therefore recommends that every effort should be made at national level to strenghten or establish, if required, appropriate institutional arrangements and mechanisms with a view to facilitating the dialogue among the institutions owning or operating research vessels and the various categories of users so as to improve short- and long-term planning as well as cruise programming and allocation of ship-time and facilities at sea by the institutions and scientists concerned.

RECOMMENDATION 4

INTERNATIONAL POOL OF EQUIPMENT AND PERSONNEL FOR TOTATIONAL USE IN THE IMPLEMENTATION OF SCIENTIFIC PROGRAMMES AND THE MAINTENANCE OF EQUIPMENT

The Workshop also recommends that IOC and FAO study the possibilities for international assistance, to expand the schemes for the pooling and rotation of capital equipment, spares and personnel, including engineers and technicians established by FAO with the assistance of UNDP and various donor agencies to cover research vessels of all categories (e.g. fisheries and oceanographic) in order to assist developing countries and others faced with similar needs in their efforts to maintain the equipment of their research vessels on a routine basis and to react to emergencies.

The Workshop appeals to UNDP, bilateral and multilateral agencies to give favourable consideration to this proposal which, if put into effect, could contribute to the viability of future or on-going bilateral arrangements by giving long-term support to the benefit of both donor and recipient countries. In this context, the Workshop also recommends that the possibility for the provision of equipment, spare parts and other forms of ad hoc assistance under the IOC Voluntary Assistance Programme should be explored.

RECOMMENDATION 5

INTERNATIONAL CO-OPERATION FOR IMPROVED USES OF RESEARCH VESSELS

The Workshop recognizes the extreme importance of research vessels for future development of oceanography. Due to the increasing demands for research at sea as a result of the establishment of EEZs or other waters within the national jurisdiction, and of the growing interest to explore and exploit the oceans for the benefit of States individually and of mankind as a whole, the Workshop considers that it is essential to rationalize and to optimize the use of the research vessels and to promote international co-operation in the field. The Workshop also encourages the sharing of experiences among countries and institutions both directly or in the framework of the appropriate international organizations such as IOC and FAO.

In this context, the Workshop notes the diversified forms of bilateral and multilateral co-operation under which shipboard training has been organized in recent years.

The Workshop also noted as a particularly effective arrangement the surveys undertaken by the R/V "Fridjof Nansen" owned and managed by Norway, and operated in co-operation with FAO with the support of UNDP and NORAD.

The Workshop strongly supported the continuation and expansion of these bilateral and multilateral forms of co-operation aimed at facilitating research at sea.

The Workshop encouraged IOC and FAO and other concerned organizations to facilitate the necessary negotiations and arrangements for this most valuable form of mutual assistance.

The Workshop also appeals to UNDP and other international funding agencies to assist financially in the above endeavours so as to make these viable and to ensure the required continuity, without which the implementation of the new ocean regime may be hampered and progress of the knowledge of the oceans, the utilization of their resources, their conservation and management as well as the protection of the marine environment, may be seriously handicapped.

The Workshop fully recognized that international co-operation in the improved use of research vessels at national and international, regional/sub-regional levels depends to a great extent on the co-operation between industrialized and developing countries as a specialized aspect of the North/South Co-operation. However, benefit can also be obtained from closer co-operation amongst developing countries, as a component of the South/South co-operation, and a special element of Technical Co-operation amongst Developing countries (TCDC).

The Workshop strongly advises that the co-operation between donor and recipient countries be based on mutual interest that would benefit from the strong commitment by both parties and, as far as possible, appropriate sharing of the costs.

The Workshop strongly advises that the IOC in the framework of TEMA, and also in the context of the Unesco/IOC Comprehensive Plan for a Major Assistance Programme to Enhance the Marine Science Capabilities of Developing Countries, and FAO, in the context of its Programme for the Development of the EEZ, and other waters within the national jurisdiction, explore ways and means to promote the required international co-operation and the provision to developing countries of the required facilities for sea-going research, particularly taking into account the needs of the less developed ones or the special case of small islands and archipelago states.

ANNEX III

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ANNEX IV

LIST OF ACRONYMS

CICAR	:	Co-operative Investigation of the Caribbean and Adjacent Regions
CNEXO	:	Centre National pour l'Exploitation des Oceans (France)
CONACyt	:	National Science and Technology Council (Mexico)
CSK	:	Co-operative Investigation of the Kuroshio
DSDP	:	Deep Sea Drilling Project
EEC	:	Exclusive Economic Zone
FAO	:	Food and Agriculture Organization (UN)
GT	:	Gross tonnage
ICES	:	International Council for the Exploration of the Sea
IIOE	:	International Indian Ocean Expedition
ILO	:	International Labour Organization
IMO	:	International Maritime Organization
INICT	:	National Agency for Scientific and Technological Research
IOC	:	Intergovernmental Oceanographic Commission
IOCARIBE	:	IOC Association for the Caribbean and Adjacent Regions
NBO	:	National Bureau of Oceanography (PR of China)
NERC	:	Natural Environmental Research Council (United Kingdom)
NIO	:	National Institute of Oceanography (India)
NK	:	Norwegian Krone

NORAD	:	Norwegian Agency for International Development
PEMEX	:	Mexican Oil Company
R/V	:	Research Vessel
TEMA	:	Training, Education and Mutual Assistance in the Marine Sciences
UNAM	:	Universidad Nacional Autonoma de Mexico
UNDP	:	United Nations Development Programme
UNOLS	:	University National Oceanographic Laboratory System

ANNEX V

MODELS OF NATIONAL COORDINATION OF RESEARCH VESSELS AND PLANNING OF RESEARCH CRUISES AS PRACTISED BY SELECTED COUNTRIES

INTRODUCTION

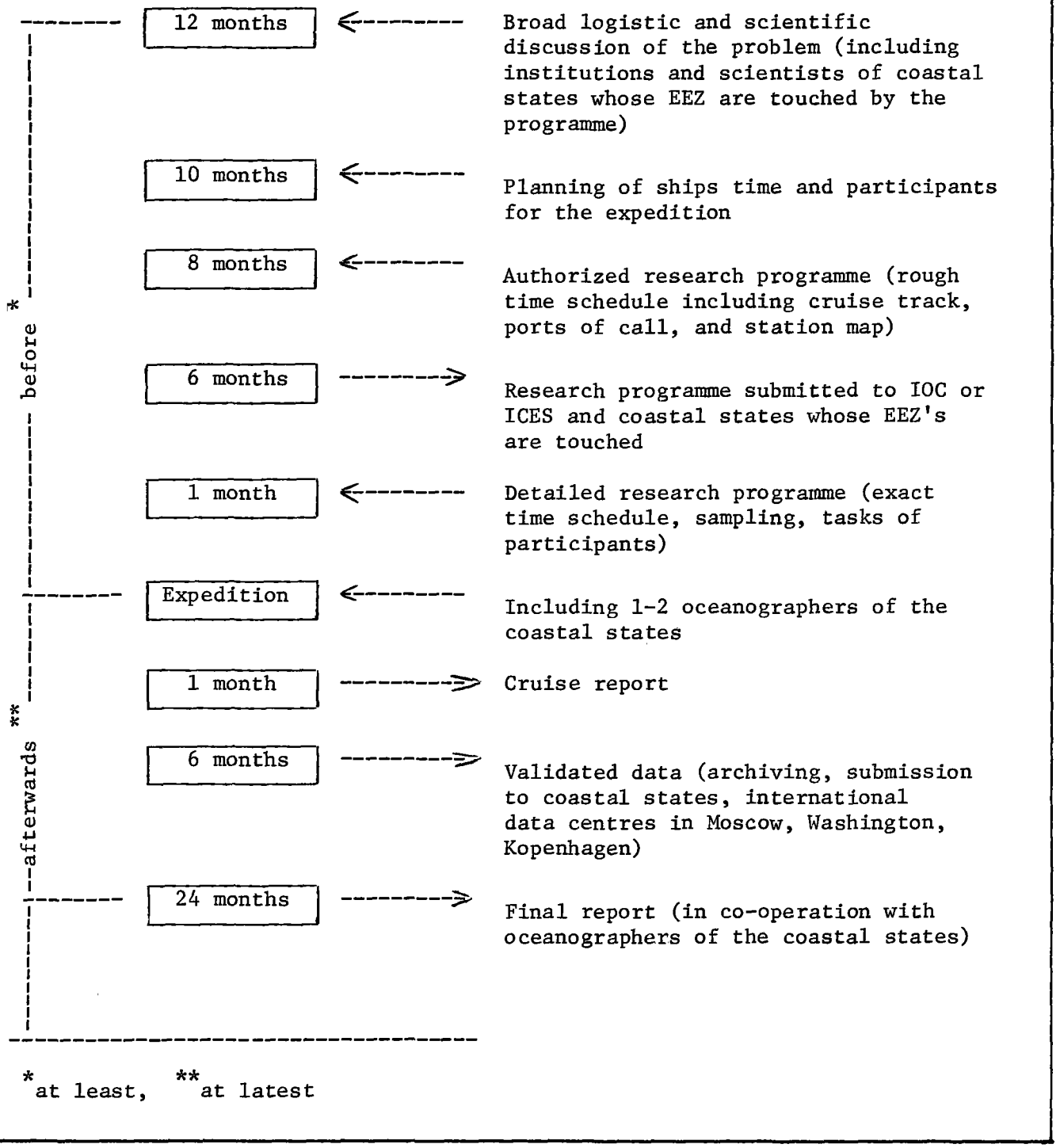
As a follow-up to the IOC/FAO Workshop on Improved Uses of Research Vessels (Lisbon, Portugal, 28 May - 2 June 1984), a number of participants had been requested to provide the Secretariat with an overview of the methods used in the planning of oceanographic research cruises.

The present Annex contains the information provided by participants from France, German Democratic Republic, India, Japan, Madagascar, Mexico, the Netherlands, Peru, Portugal, United Kingdom, United States of America.

Organizational and administrative arrangements are reflected as far as possible in a flow chart, while information regarding the institutional arrangements are usually presented in an introductory statement.

For ease of representation the provided information has been presented as a country basis. It should, however, be remembered that participants attended the above Workshop in their personal capacity only.

1. PLANNING OF OCEANOLOGICAL EXPEDITIONS IN THE GERMAN DEMOCRATIC REPUBLIC



2. CRUISE PLANNING BY THE FISHERY SURVEY OF INDIA

The Fishery Survey of India (FSI) is the national agency entrusted with the assessment of living resources in the Indian EEZ, which covers about 2.0 million square kilometres. The FSI's immediate task is the assessment of the fishery resources in the continental shelf and the continental slope, which has an area of about 0.5 million square kilometres.

Applied oceanographic research in relation to fisheries is undertaken by ten survey vessels of 30 to 40.5 m length. Its purpose is to provide the information required by the Government for development planning, and the preparation of fishing and fishery charts for fishermen and the fishery industry. Special attention is given to the survey of demersal stocks down to about 500 m.

The vessels used in this research operate from six coastal bases. To each base is attached a Zonal Consultative Group (ZCG) which operates on a regional basis under the authority of the Director of Fisheries of the province concerned. At a national level the National Consultative Group (NCG) is composed of representatives from the National Institute of Oceanography, the Central Marine Fisheries Research Institutes, the Department of Agriculture, the Government of India, the Director General of Shipping, the private fishing industry, and senior scientists from FSI.

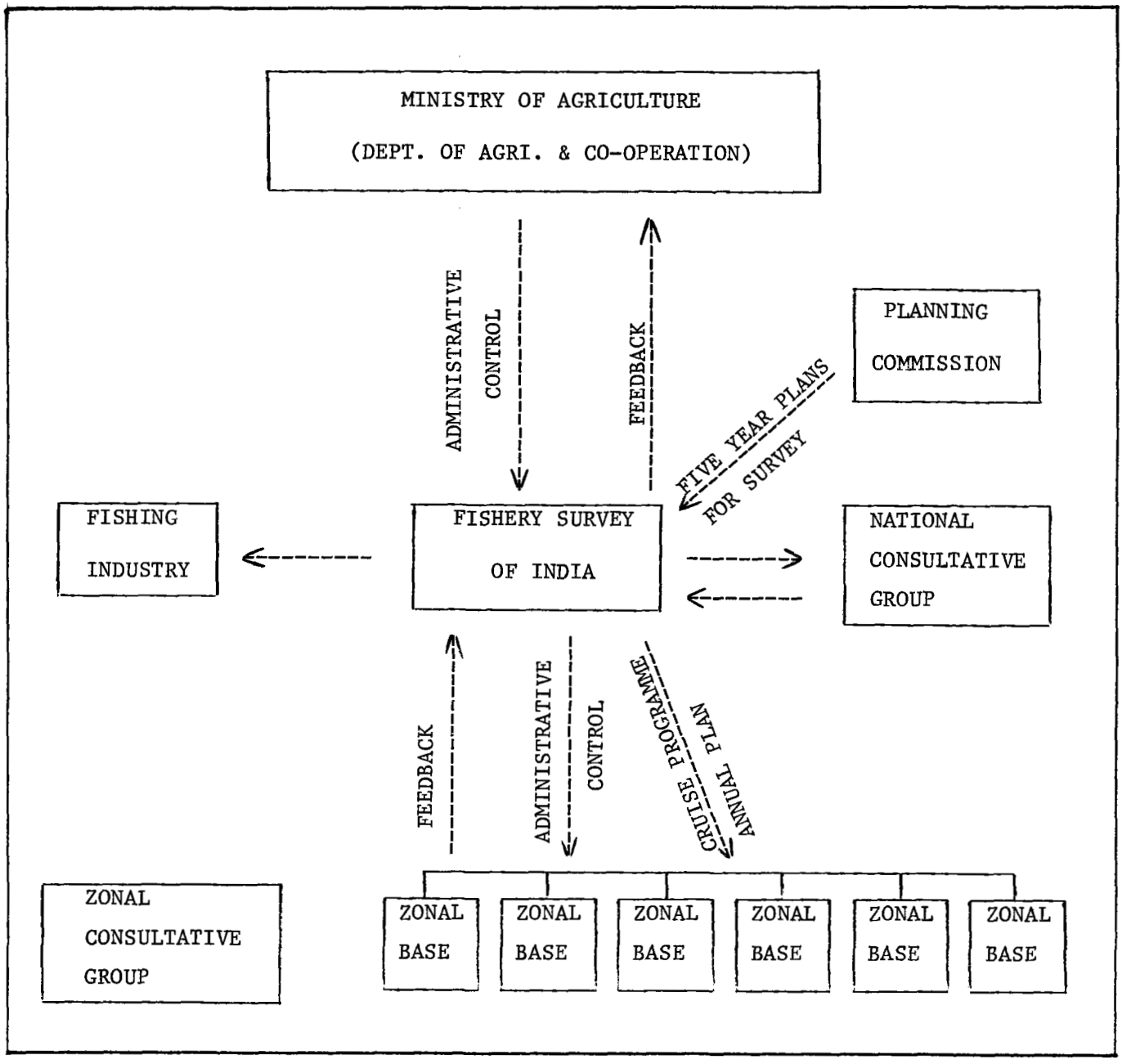
Programming of cruises for execution by FSI are synchronized with the Five Year Plan and the Fiscal Plan of the Country. Five Year programmes are drawn up in broad terms of area, extent, priority, etc., by the Department of Agriculture (planning commission) on the basis of the results from preliminary surveys of demersal and pelagic resources on the continental shelf. Annual cruise plans are drawn up by the FSI.

Actual cruise planning starts six months prior to the beginning of each fiscal year (April), with the formulation of the guidelines by the FSI Headquarters in consultation with the NCG. Based on these guidelines, the different zonal bases propose cruise plans for local execution in consultation with the ZCG attached to each base. FSI Headquarters reviews these proposals and prepares detailed annual cruise plans for each zonal base in consultation with the NCG. These cruise plans are then published. As far as implementation is concerned, the primary responsibility rests with the Head of the zonal base and the Director of FSI. Feedbacks are obtained by the FSI Headquarters in the form of monthly reports and detailed cruise reports.

The progress of implementation is reviewed by the zonal and national consultative groups once every three months as well as by the Department of Agriculture.

At all levels of programming and review all interested parties including the fisheries industry are invited.

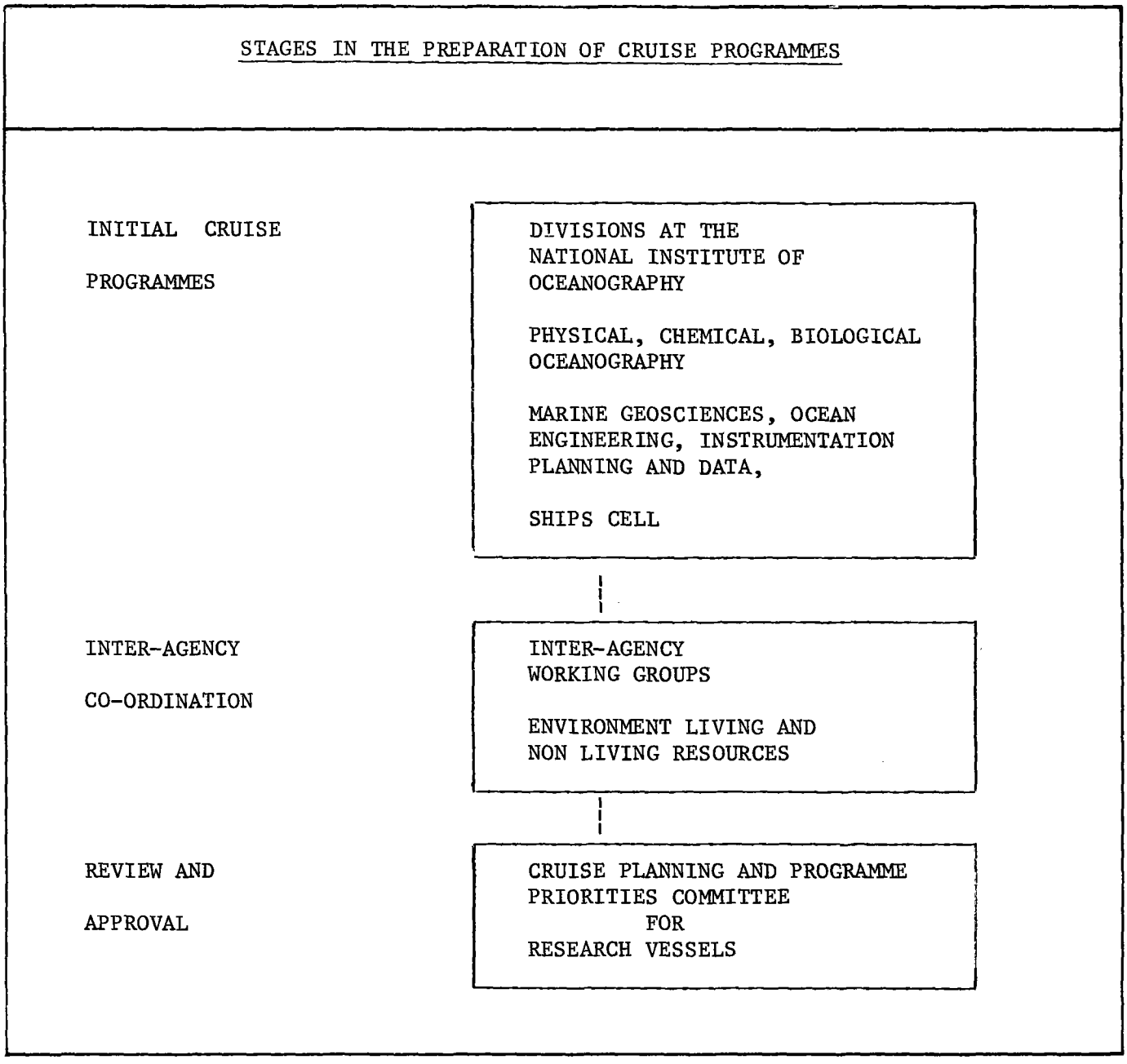
The following flow chart shows the relationship between the F.S.I., its zonal bases, the Ministry of Agriculture, consultative groups, etc.



3. PROGRAMMING OF RESEARCH VESSELS CRUISES BY THE NATIONAL INSTITUTE OF OCEANOGRAPHY IN INDIA

In India, cruise programmes of research vessels are proposed initially at the National Institute of Oceanography, and subsequently discussed at a Workshop of the participating organizations. This Workshop provides a useful forum for scientists and allows for the formulation of linkages between institutional and interdisciplinary programmes. The outcome of the Workshop is submitted to the Cruise Planning and Programmes Priorities Committee for Research Vessels for Approval.

STAGES IN THE PREPARATION OF CRUISE PROGRAMMES



4. PLANNING OF RESEARCH VESSEL CRUISES IN JAPAN

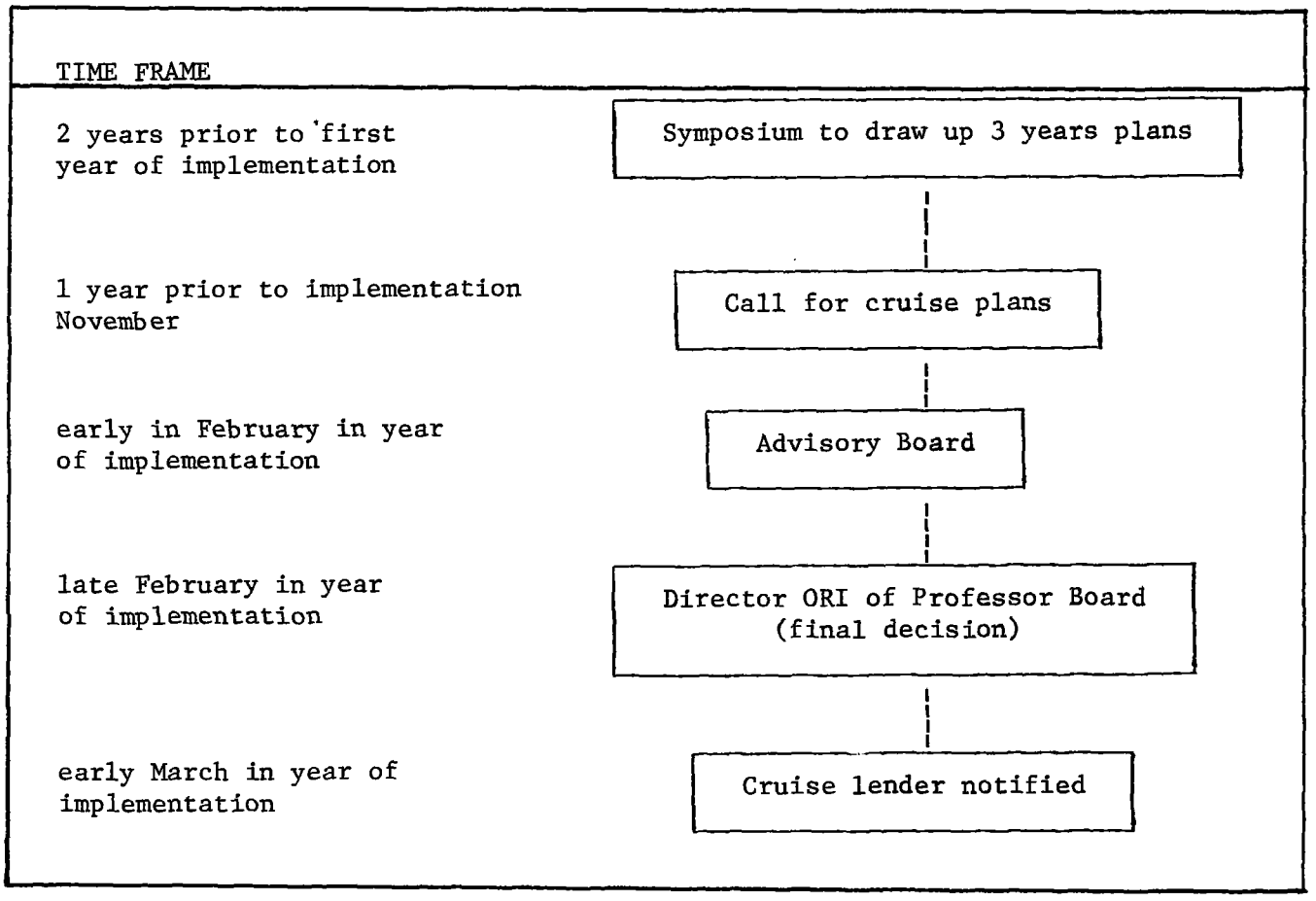
Several agencies operate research vessels. Amongst these are:

- Ocean Research Institute (ORI) of the University of Tokyo;
- Fishery Departments in several universities;
- Tokai University;
- Meteorological Agency and Hydrographic Department of the Ministry of Transportation;
- Fishery Agency of the Ministry of Agriculture and Fisheries
- Geological Survey of MITI
- Japanese Marine Science and Technology Centre (JAMSTC) under the Science and Technology Agency

In order to avoid duplication of efforts co-ordination meetings are held amongst the agencies operating under the ministry of transportation and the ministry of agriculture and fisheries. Co-operation exists between ORI and JAMSTEC, especially in the use of submersibles.

While each agency has its own procedure for the establishment of cruise plans, the following diagram is illustrative of procedures utilized for the planning of cruises by university research vessels. It shows the method employed by ORI for the R/V "Makuhomaru".

JAPAN MARINE SCIENCE AND TECHNOLOGY CENTRE



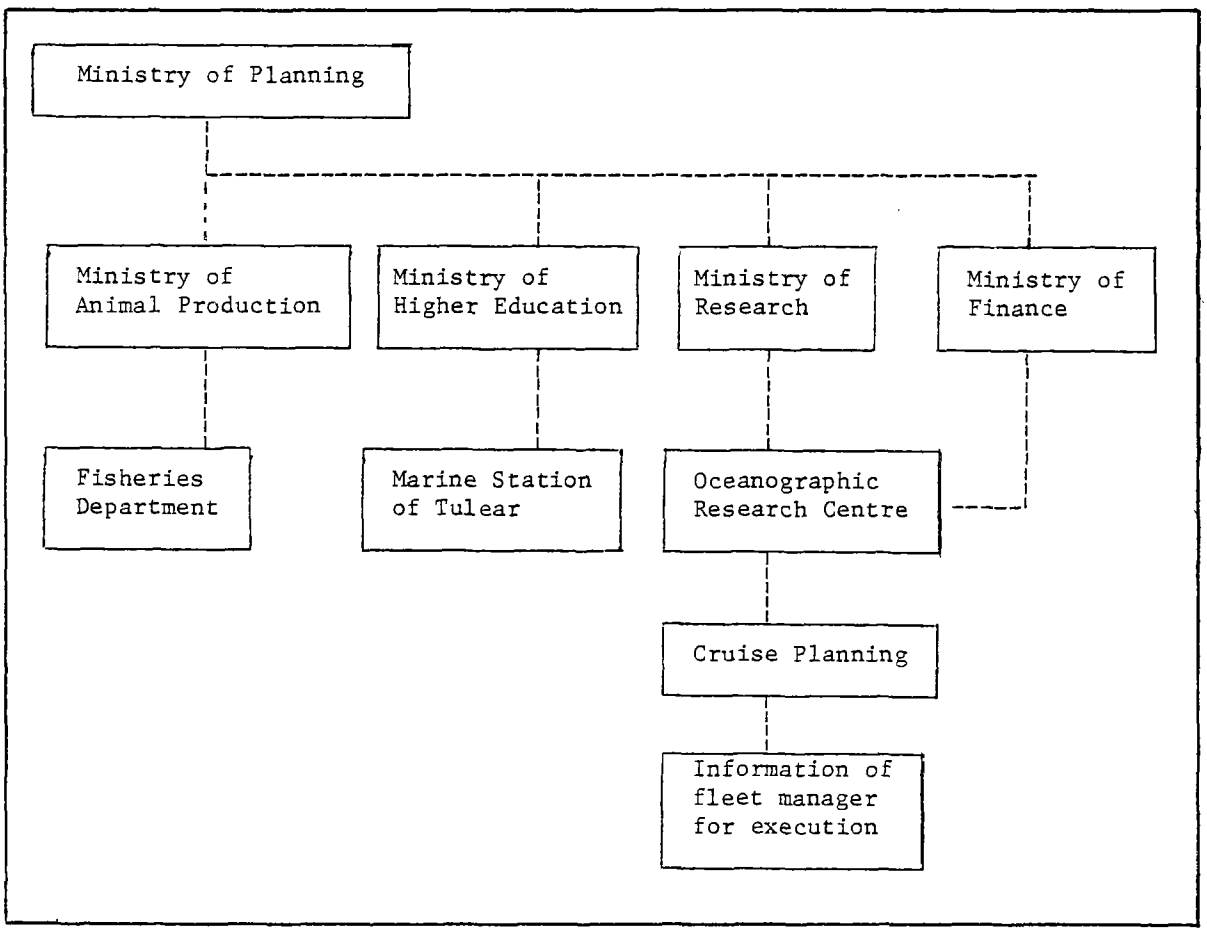
5. PLANNING OF RESEARCH CRUISES IN MADAGASCAR

Planning of research cruises starts with the submisson of research proposals by different ministries to the Ministry of Planning. Such proposals must be established on a three to five year basis, and the benefits likely to be derived from the execution of the proposed research must be clearly indentified, e.g. increased food production, provision of raw material to the industry, improvement in the balance of payments etc.

The need for equipment, manpower and ship-time for individual projects are planned annually at the international level before November. A provisional budget is drawn up and submitted to the Ministry of Finance. Usually the budget is agreed upon by January-February of the next year. A programme for sharing ship-time over all approved projects is drawn up on a monthly basis by the fleet manager and must be adhered to by all scientists.

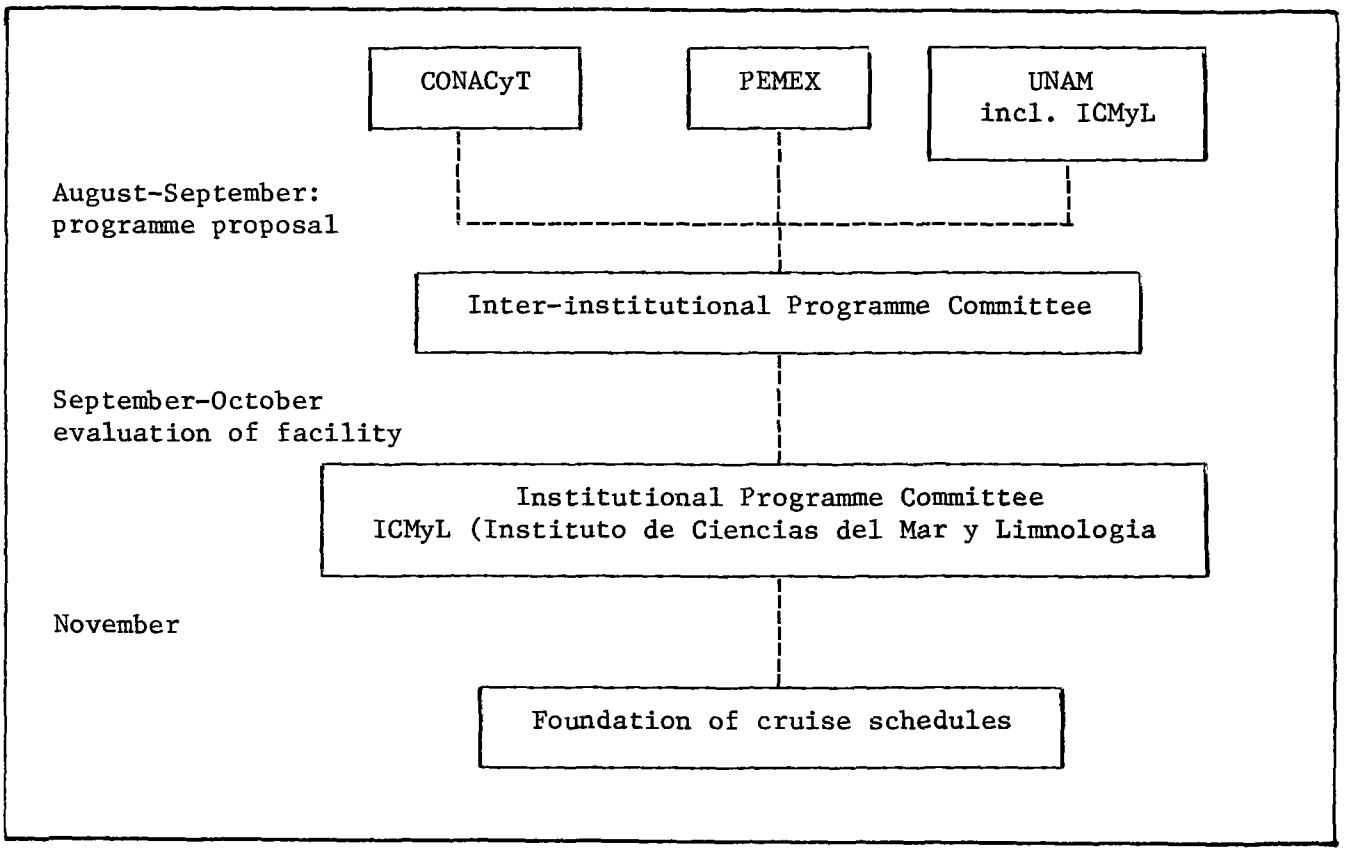
A practical briefing is organized one or two days prior to the departure of the vessel. Evaluation of the use of ship-time is done on a bi or tri-monthly basis to allow for eventual adjustments.

The following diagram provided by the Centre National de Recherche Oceanographique shows the organization of marine scientific research and of research cruise planning, in Madagascar. It must be pointed out that up to now there is no scientific council co-ordinating the activities of the different institutions.



6. OCEANOGRAPHIC RESEARCH VESSELS IN MEXICO

The following diagram showed the procedure used by the R/V "El Puma" and the R/V "Justo Sierra". The vessels are the property of the University of Mexico (UNAM) and are operated by UNAM in the systematic exploration of the Mexican exclusive economic zone and its resources. Crew are university employees. Operational costs are shared equally between CONACyT (National Council of Science and Technology), PEMEX (National Oil Company) and UNAM (National University of Mexico).



7. THE NETHERLANDS

Applied oceanographic research is carried out by several specialized agencies reporting to a parent ministry. The results of their work provide the government with data on which legislation and policy decision may be based. Most agencies are also involved in consultancy to other governmental bodies and private firms. These organizations usually own their own vessels and oceanographic equipment and cover operating expenses through their regular budget.

Larger programmes in the field of applied oceanographic research generally extend over several years. However, short projects set up to solve a specific problem are more numerous. The main organizations are:

The North Sea Department of the Ministry of Public Works (RWS - NZ - Rijkswaterstaat - Directie Noordzee), is concerned with the management of the Netherlands sector of the North Sea notably with regard to technical and nautical problems related to engineering projects and to pollution. The department has a long-standing agreement for co-operation with RGD. RWS - NZ operates 6 research vessels.

The Geological Survey of the Netherlands (RGD - Rijks Geologische Dienst) is a governmental organization entrusted with mineral resources management, other applied marine geological research including worldwide consultancy work and the geological mapping of the Netherlands sector of the North Sea. The survey uses ships from RWS - NZ for North Sea activities and other ships for activities elsewhere.

The Hydrographical Department of the Royals Netherlands Navy (DHKM - Dienst der Hydrografie van de Koninklijke Marine) part of the Ministry of Defense, executes hydrographic and meteorological work and provides ship time, if available and upon request, to other sea-going groups mainly from universities for various kinds of oceanographical research. These activities for other groups are in part co-ordinated by NRZ. The department runs 3 hydrographic vessels.

The State Institute for Fisheries Research (RIVO - Rijks Instituut voor Visserij Onderwoek), a governmental institute operating under the Ministry of Agriculture and Fisheries was established to conduct largely applied but also fundamental research in the field of fisheries, mainly fish stock management, fishing gear research and chemical research related to water quality and the quality of fishery products. The institute operates 2 research vessels and 5 small craft.

Fundamental oceanographic research is conducted by a small number of groups most of which are operating under the Ministry of Education and Sciences. Most of the groups that are involved in fundamental oceanographic research are for ship time and/or (part of) their equipment also dependent on the Netherlands Council of Sea Research, (NRZ) an organization of the Ministry of Education and Science. Most of their larger oceanographic research programmes are approved and supported by NRZ. The main organizations are :

Universities and related institutes, comprise widely differing sea-going groups that are involved in fundamental oceanographic research. Universities in the Netherlands are semi-governmental organizations resorting under the Ministry of Education and Sciences. Technical and instrumental facilities at universities are very modest, which means that NRZ or DHKM ships are used and that most of the oceanographic equipment they use is managed by NRZ. The groups conduct marine biological, marine geological, marine physical or marine chemical research.

The Netherlands Council for Sea Research (NRZ - Nederlandse Raad voor Zeeonderzoek) is part of the Royal Academy of Sciences, which is dependent on the Ministry of Education and Science. NRZ tries to promote, manage and co-ordinate fundamental oceanographic research in the Netherlands. NRZ receives research proposals, evaluates them in specialized NRZ commissions and, in part, approves them. The next step is their inclusion in short-term and long-term planning. NRZ also formulates a national programme for fundamental research on an annual basis. Moreover, NRZ operates a big research vessel, manages a large collection of oceanographic equipment and distributes funds for scientific sea-going expeditions.

The Netherlands Institute for Sea Reserch (NIOZ - Nederlands Instituut voor Onderzoek der Zee), belongs to the Zoological Association but is subsidized by the Ministry of Education and Science. It performs fundamental oceaographic research in such areas as marine biology, biochemistry, pollution, geochemistry, physics, etc. with a clear emphasis on biological work. The institute manages 2 vessels and 2 small craft and owns some equipment. In addition, NIOZ has facilities to store and service a large part of the NRZ equipment.

The Royal Netherlands Meteorological Institute (KNMI - Koninklijk Nederlands Meteorologisch Instituut), a part of the Ministry of Public Works, conducts fundamental but also applied research in the field of meteorology and physical oceanography. The institute uses own and NRZ equipment on NRZ and other vessels. The organizational structure in the Netherlands of oceanographic research is summarized in the following tables:

Time frame for planning and execution of cruises

More or less flexible cruise plans of RWS - NZ, RGD and RIVO and other organizations that operate ships or that have long-term agreements for appreciable amounts of shiptime are usually put together in the fall of the year before they are due. Most cruises in the field of applied oceanography and almost all North Sea cruises belong to this category. This system does not exclude the possibility of organizing a cruise at short notice if there is an urgent need to do so.

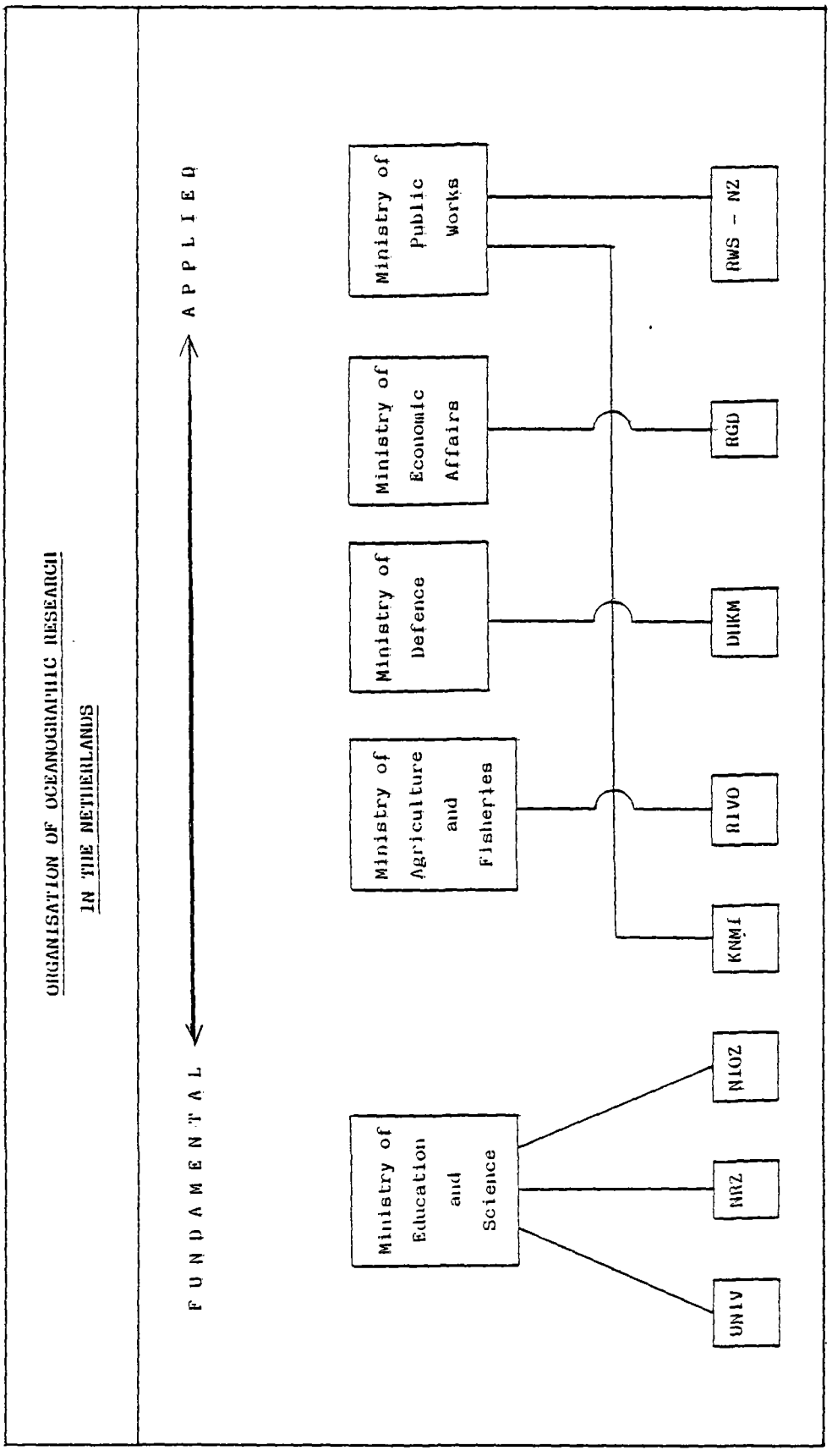
These cruises are generally manned by own personnel or personnel from other, co-operating organizations. The equipment generally belongs to the participating organization(s).

The organization of most fundamental oceanographic cruises, as co-ordinated by NRZ is more complicated. It all starts with a scientific proposal that after review is accepted by NRZ and incorporated in its current 4 year plan.

Eighteen to sixteen months before each cruise, the expedition leader is nominated, the ship and secondary objectives are identified and there is an application to obtain oceanographic equipment from NRZ on loan.

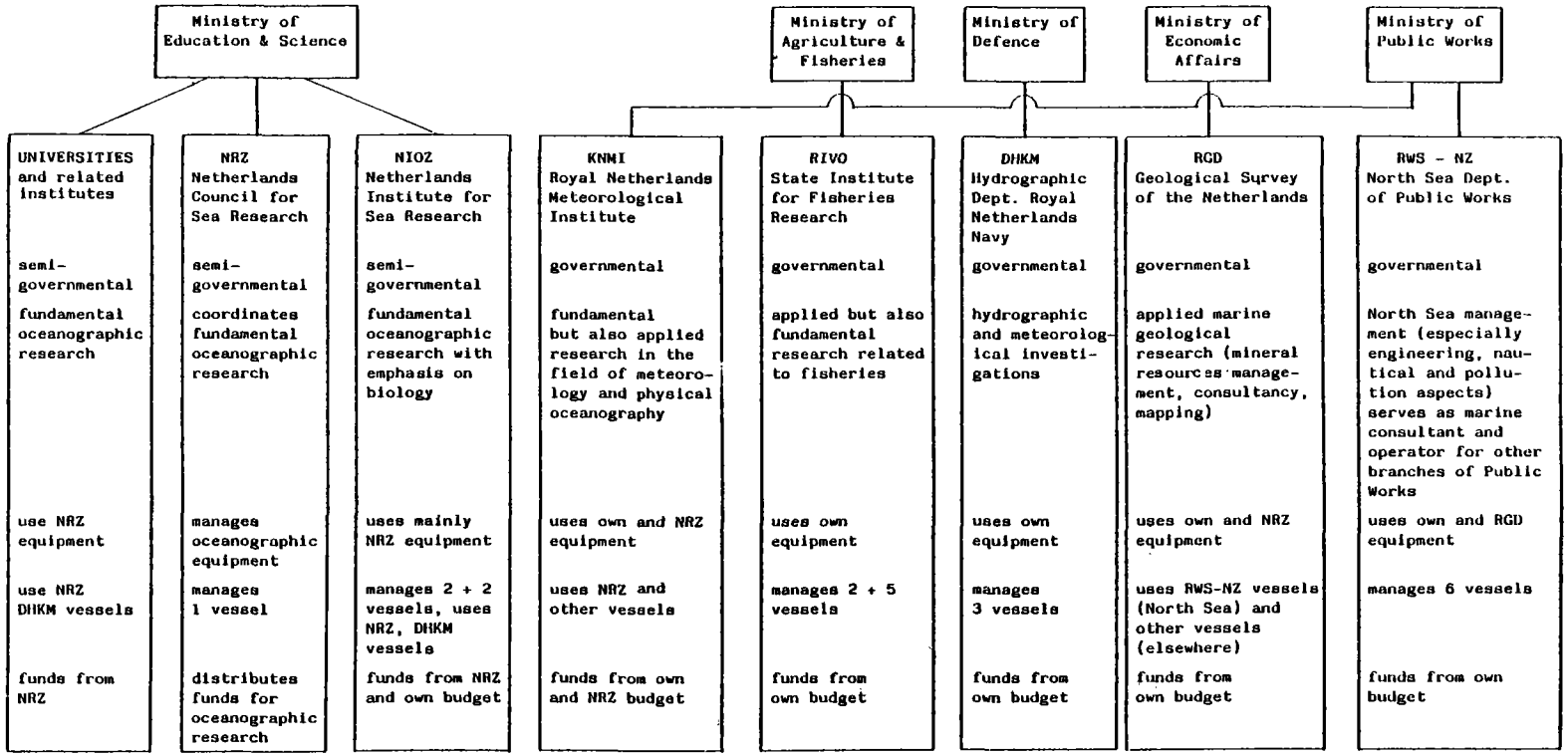
Twelve to six months in advance, the number of berths and space available on board are identified as well as the number and nature of participants. Relevant topics are discussed between NRZ, the expedition leader, the ship and other interested parties.

Less than 2 months before departure, items like the positioning of containers on board, a general stowage plan and a plan for transport are dealt with. During the cruise NRZ gets summarized information on ship's movements three times a week. Within a month after the cruise a short NRZ cruise report has to be sent by the expedition leader to NRZ.


ORGANISATION OF OCEANOGRAPHIC RESEARCH
IN THE NETHERLANDS
FUNDAMENTAL
APPLIED
Ministry of Education and Science
Ministry of Agriculture and Fisheries
Ministry of Defence
Ministry of Economic Affairs
Ministry of Public Works
UNIV
NRZ
NIOZ
KNMI
RIVO
DIKM
RGD
RWS - NZ

ORGANISATION OF OCEANOGRAPHIC RESEARCH IN THE NETHERLANDS

FUNDAMENTAL ⟷ APPLIED



8. PLANNING OF MARINE SCIENTIFIC RESEARCH IN PERU

This statement presents the procedures for research cruise planning, as applied by IMARPE, the Instituto del Mar del Peru.

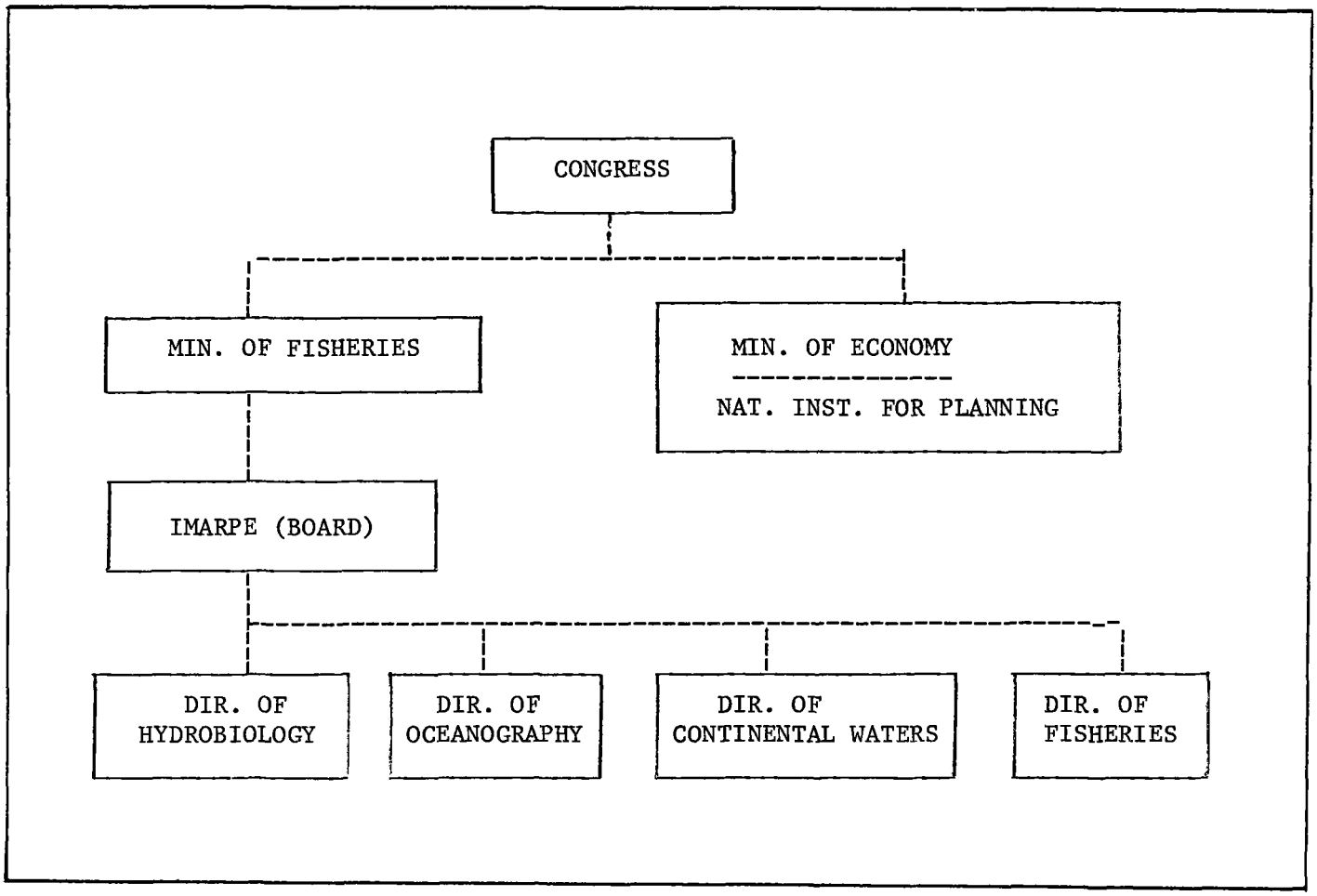
IMARPE is governed by a board of directors, consisting of representatives from the Ministry of Fisheries, the Universities, the private fisheries sector and the Navy. Programmes are executed by four directorate generals : hydrobiological resources, oceanographic investigations, continental waters, and fishery technology.

IMARPE is a government organization funded through the budget of the Ministry of Fisheries. Since these are public funds, the budget of the Institute must be approved by the Ministry of Economic Affairs as well as by the National Institute for Planification, and be ratified by the Congress.

The following procedure is applied for the planning of oceanographic research at IMARPE :

- establishment of general policy guidelines by the board;
- proposal of cruise plans by the Directorates General to the Board;
- submission of these plans and their budgetary implications by the board to the Ministry of Fisheries;
- submission of the proposed budget by the Ministry of Fisheries to the Ministry of Economic Affairs and the National Institute of Planning for approval or modification;
- remittance of the budget, as approved by the Ministry of Economic Affairs and the National Institute for Planning, by the Ministry of Fisheries to the Congress for ratification;
- upon receipt of the ratified budget, appropriation of funds for IMARPE by the Ministry of Economic Affairs under the Budget of the Ministry of Fisheries;
- notification of the Board by the Ministry of Fisheries on the approved budget;
- authorization by the Board for the execution of selected cruises by the Directorates.

This organizational structure is reflected in the following outline:



9. PORTUGAL

Policy co-ordination is done through the Permanent Commission of Oceanology (PCO), created in 1979 within the National Council for Scientific and Technological Research under the Ministry of State.

It is composed of representatives of the Ministries of Education, Industry, Public Works, Finances, Sea, Foreign Affairs and Environment, Acores and Madeira local governments, Navy and Air Force and scientists of recognized experience in the field of Oceanography(2)

Its role is to assist, co-ordinate and assess the national activities of scientific and technological research in the field of ocean sciences.

It has no budget to support research so its mission is mainly trying to co-ordinate the activities of the several institutions who deal with the ocean environment.

Research vessels are operated by two independent agencies:

- IH - HYDROGRAPHIC INSTITUTE - NAVY 6 vessels

- INIP - NATIONAL INSTITUTE OF FISHERIES RESEARCH - MINISTRY OF SEA 3 vessels

Cruise planning has been done until now independently based on the programmes of each institution. Two typical examples are the procedures adapted by the Hydrographic Institute (IH) and the National Institute of Fisheries (INIP).

The Hydrographic Institute, in September of each year, contacts these institutions that are usually interested in the services of the IH, including ship-time, and requests them to send in their eventual requests.

If they can be considered they will be included in the "ANNUAL ACTIVITIES PLAN" that is prepared in Oct/Nov and approved by the Chief of the Naval Staff.

The Annual Plan, containing project proposals but no dates, is then sent to government agencies and institutions with which the IH has relations both at home and abroad.

When the ship's schedule is known, a copy is sent to the PCO with indications of the ship-time available and costs per day.

Interested organizations will then put their requests through the PCO for assessment.

Co-operative cruises have been done with some universities and other institutions but ship-time available is scarce and frequent breakdowns of the bigger ships make cruise scheduling difficult to predict in advance.

For the National Institute of Fisheries Research (INIP) the yearly programme is usually established at the end of the previous year.

It is aproved by INIP's General Director after it has been prepared by the Scientific and Technical Council, an ad hoc Technical Commission and Ships Department.

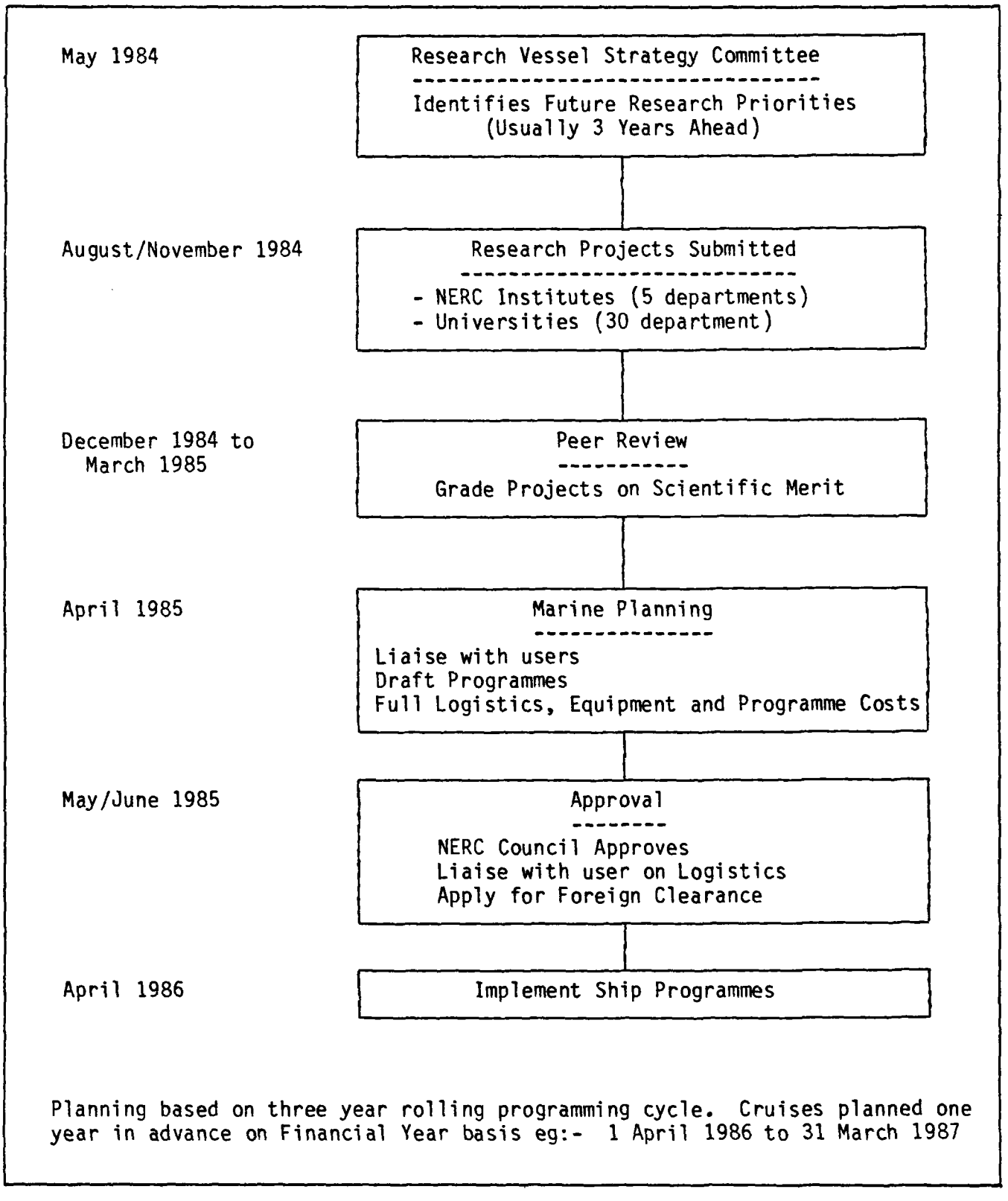
INIP's own programmes leave usually little or no ship-time available for other institutions except Azores and Madeira and regional governments.

Some universities and government agencies carry out research programmes in the fields of physical and biological oceanography as well as in marine geology.

However, funds available for research in these areas are very limited, which makes it virtually impossible to pay for ship-time.

These universities and agencies must therefore seek co-operation with INIP and IH, not always feasible, or foreign universities and institutions. The unavailability of ship-time is a crucial factor limiting the research capability of the universities and other non-independent government agencies.

10. CRUISE PLANNING AT NERC IN THE UK



Planning based on three year rolling programming cycle. Cruises planned one year in advance on Financial Year basis eg:- 1 April 1986 to 31 March 1987

11. SHIP PLANNING AND SCHEDULING PROCEDURES APPLIED IN THE USA (UNOLS)

The following diagram shows the US system for planning/scheduling of ships as applied by the University National Oceanographic Laboratory System. In order to fully comprehend the diagram the following information may be useful: (Source: "Annotated Acronyms and Abbreviations of Marine Science Related Activities - US Department of Commerce - (1981)).

UNOLS: University National Oceanographic Laboratory System, established in 1972 as a result of a recommendation by the Stratton Commission, the purpose of UNOLS is to co-ordinate the research efforts and access to research facilities such as ships and submersibles by universities and other research laboratories;

NSF: National Science Foundation.

Established in 1950, the NSF promotes science through support of education and, especially basic research. It supported several international oceanological programmes and lends financial support to UNOLS.

ONR: Office of Naval Research

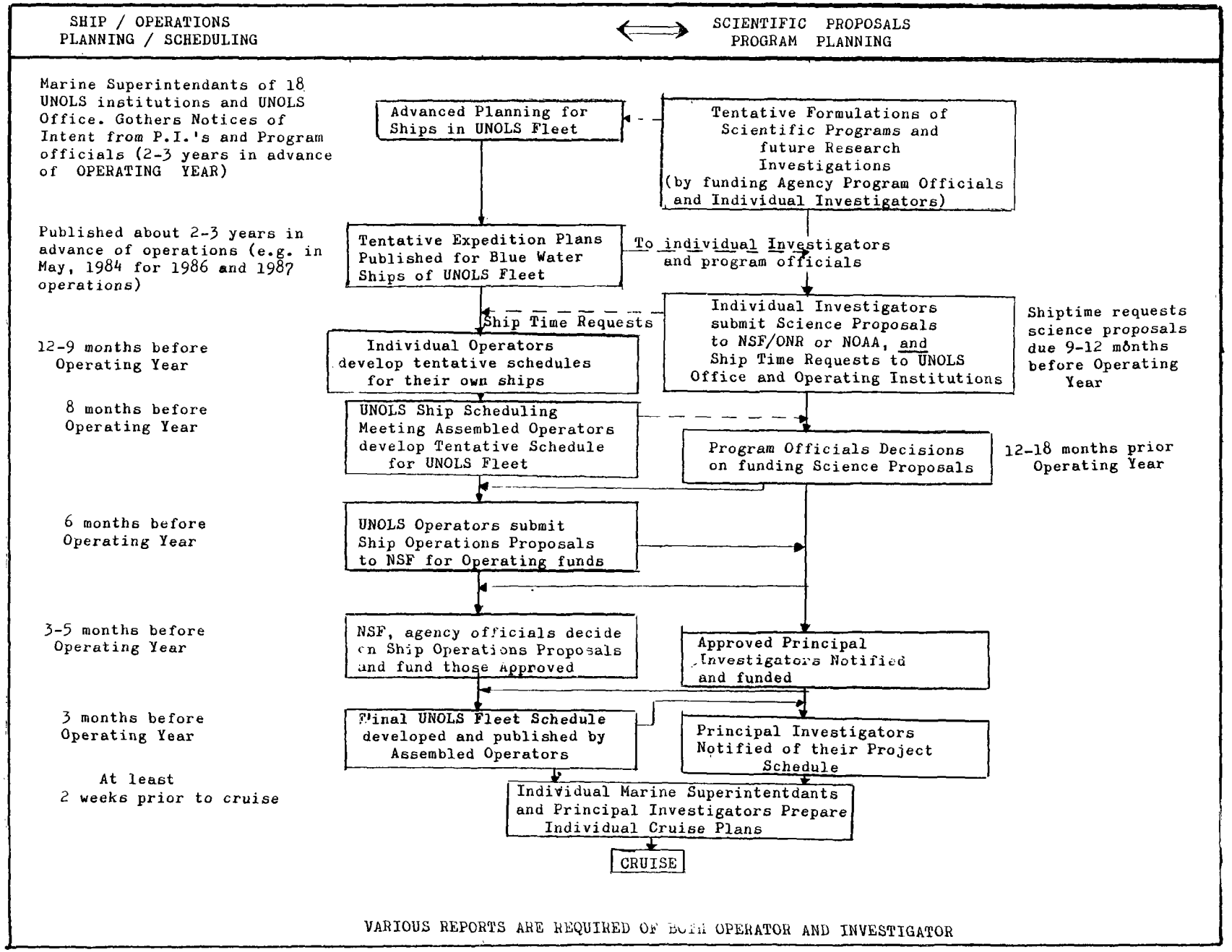
The ONR plans and co-ordinates research programmes of naval relevance throughout the Department of the Navy and executes contracts for doing research at educational and other non-profit institutions.

NOAA: National Oceanic and Atmospheric Administration

Organized in 1970, NOAA assumes the functions of the environmental science programmes administered by the NSF and a number of Federal agencies. The responsibilities of NOAA include development of environmentally sound coastal zone management programmes, sponsoring of oceanic research and making extensive oceanographic surveys.

Dotted lines in the diagram represent information flow or recommendations. Solid lines are formal submissions, responses, decisions, etc.

THE UNITED STATES SYSTEM (UNOLS ONLY) FOR SHIP PLANNING / SCHEDULING



No.	Title	Publishing Body	Languages
32 Suppl.	Papers submitted to the UNU/IOC/Unesco Workshop on International Co-operation in the Development of Marine Science and the Transfer of Technology in the Context of the New Ocean Regime Paris, 27 September-1 October 1982	IOC, Unesco Place de Fontenoy Paris, France	English
33	Workshop on the IREP Component of the IOC Programme on Ocean Science in Relation to Living Resources (OSLR) Halifax, 26-30 September 1983	IOC, Unesco Place de Fontenoy 75700 Paris, France	English
34	IOC Workshop on Regional Co-operation in Marine Science in the Central Eastern Atlantic (Western Africa) Tenerife, 12-17 December 1983	IOC, Unesco Place de Fontenoy 75700 Paris, France	English French Spanish
35	CCOP/SOPAC-IOC-UNU Workshop *on Basic Geo-scientific Marine* Research Required for Assessment of Minerals and Hydrocarbons in the South Pacific Suva, Fiji, 3-7 October 1983	IOC, Unesco Place de Fontenoy 75700 Paris, France	English
36	IOC/FAO Workshop on the Improved Uses of Research Vessels Lisbon, 28 May - 2 June 1984	IOC, Unesco Place de Fontenoy 75700 Paris, France	English