EUROPEAN SCIENCE FOUNDATION
SETTING SCIENCE AGENDAS FOR EUROPE

MARINE BOARD

Position Paper 10

European Ocean Research Fleets

March 2007

Towards a Common Strategy and Enhanced Use

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Marine Board - ESF

Building on developments resultant from the 1990s *European Grand Challenges in Marine Research* initiative, the Marine Board was established by its Member Organisations in 1995, operating within the European Science Foundation (ESF). The Marine Board's membership is composed of major National marine scientific institutes and / or funding agencies. At present, 16 countries are represented by one or two agencies or institutes per country, giving a total membership of 23.
The Marine Board operates via an elected Executive Committee, consisting of one Chairperson and four Vice-Chairpersons. The Marine Board also confers permanent observer status to the European Commission's Directorate General for Research and Directorate General for Fisheries and Maritime Affairs.

In developing its objectives, the Marine Board focuses its activities around **four main approaches**:
Forum: bringing together member organisations to share information, to identify common problems and, where appropriate, find solutions, develop common positions, and cooperate on scientific issues.
Strategy: identifying and prioritising emergent disciplinary and interdisciplinary marine scientific issues of strategic European importance, initiating analysis and studies in order to contribute to a European strategy for marine research.
Voice: expressing a collective vision of the future for European marine science in relation to developments in Europe and world-wide, and improving the public understanding of science.
Synergy: fostering European added value to component national programmes, facilitating access and shared use of national marine research facilities, and promoting synergy with international programmes and organisations.
To date, the principal achievements of the Marine Board have been to:
- Facilitate the development of *marine science strategies*;
- Improve *access to infrastructure* and the shared use of equipment;
- *Advise on strategic and scientific policy issues* relating to marine science and technology at the European level (e.g. Sixth and Seventh Framework Programme, the Green Paper on the Future Maritime Policy, Marine Environment Strategy, and the European Strategy Forum on Research Infrastructures);
- Publish strategic *position papers on key topics* addressing: Marine Biodiversity, Marine Biotechnology, Hydrodynamic Modelling in Coastal and Shelf seas, Integrating Marine Science in Europe, Navigating the Future III, climate change, etc.;
- Provide strategic and operational management of MarinERA (an EU ERA-NET project, ERAC-CT-2004-515871, coordinated by Ifremer (Institut Français de Recherche pour l'Exploitation de la Mer) which aims at facilitating the coordination of national and regional marine RDT programmes in Europe.

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European Ocean Research Fleets

Towards a Common Strategy and Enhanced Use

The Ocean Research Fleets Working Group Report (OFWG)

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Navigare Necessum Est,
Vivere Non Necesse

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Foreword

The Marine Board regularly establishes Working Groups of experts to address marine science and technology topics which require further elaboration. These Working Groups facilitate experts to discuss together, reinforce their relations, create new opportunities and establish common approaches to initiatives, while also heightening awareness and visibility of the topic addressed. The expected output of such a Working Group is, in principle, a position paper to be used subsequently at national and European levels.

The issue of the European ocean research fleets and their associated large instruments was identified in 2003 by the Marine Board as a subject which merited the establishment of a Working Group. It is indeed essential to place marine infrastructure requirements in support of future marine priorities at the forefront of both European Union and national policy related agendas. This Working Group, entitled the *Ocean Research Fleets Working Group*, chaired by Jacques Binot (Ifremer), concentrated on providing an inventory and description of the existing fleets and elaborated recommendations for the enhanced use and management of fleets and associated large equipment on a pan-European level.

The analysis presented here has been carried out directly by European fleet managers and operators. Their report provides a comprehensive overview of status of the European research fleets and their use. For example, the Working Group report states that the average age of the Regional class Vessels in 2005 was 19 years, and that if renewal is not secured, the number of Regional class vessels could decline by 60% in the next 10 years. The report provides a baseline document profiling strengths, challenges and possible threats towards consolidating and building up future competitive partnerships. This analysis provides a landmark in the understanding of these issues in Europe. The report represents a sound basis on which to develop further progress in the integration of the European fleets, which is pivotal to securing Europe's lead in marine research and technology for the future.

The very practical recommendations, resultant from the work of this group, directly reflect the views of the fleet managers involved. The recommendations are directed towards both the research community and policy makers, both nationally and at a pan-European level. Implementation of the recommendations directed to the Marine Board would require formal endorsement by the Marine Board Member Organisations. Opportunities for continuation of initiatives to address recommendations in this report include the use of European Union Framework Programme instruments such as ERA-NETs which are relevant to the research infrastructure community.

The Marine Board sincerely thanks the Chairman, Jacques Binot, and Members of the Working Group for their work in addressing a subject crucial to securing the future investment in, and maximising use of, Research Vessels and related equipment, improving their interoperability and enhancing reciprocal access on a pan-European scale.

Lars Horn
Marine Board Chairman
March 2007

Jean-François Minster
Former Marine Board Chairman (2002-2006)
March 2007

Mandate for Ocean Research Fleets Working Group (OFWG)

Improving the investment strategy as well as the management of ocean Research Vessels on the European scale is a necessity. Indeed:

– Current ocean research requires a variety of high technology vessels and tools which can be assembled only on the European scale (and only on a world scale for specific large vessels);
– Current ocean research issues are frequently addressed by large teams using a variety of instruments, or through the coordinated operation of several vessels; such operations are often feasible only by relying on teams from all over Europe;
– New instruments are increasingly complex, specialised and expensive and can frequently be developed only in partnership;
– The present fleets are ageing, and long-term plans for their replacement are required; shared investment is an option for some of these new vessels.

The OFWG will study the existing European ocean Research Vessels (those more than 35m in length) and their management, with the goal to establish an approach for a common strategy, and to enhance their use on the European scale.

The OFWG will therefore address the following issues:

Section A. Description of existing fleets and their management

This issue will mostly be addressed by updating and extending the European report of von Spee et al. (NatFleet 2000).

A1. Describe the existing vessels, including their present status and their foreseeable evolution in the next 5 to 10 years.

A2. Describe the existing fleet of large exchangeable instruments and their foreseeable evolution. This should include submersibles, ROVs, large AUVs, subsurface and deep-sea towed instruments, deep-sea observatories and large attached instruments such as multibeam echo-sounders and coring equipment.

A3. Describe the present management processes, including ship operation, scientific management and funding processes, and their evolution. The influence of European research projects on shiptime usage should be assessed. An assessment should be made of shiptime that is available but unused because of lack of funding.

A4. Describe the existing partnerships within Europe, and their respective advantages and limitations. This could include shared investments, common cruises, exchange of announcement of opportunities (AO), exchange of shiptime or equipment and instruments, chartering (within Europe), common AO.

Section B. Recommendations for an enhanced European ocean research fleet and its management

B1. Suggest enhanced means using the European fleet more efficiently and the methods necessary for implementation. This will include the development of mechanisms to maximise the use of shiptime, including access by new Member States.

B2. Propose approaches to long-term European investment strategies for vessels, equipment and instruments.

The OFWG would be composed of approximately 10 people from various European zones, in charge of fleet management, in association with scientists with a broad view, from different disciplines (marine geosciences, physical and bio-geochemical oceanography, marine ecosystems and biology). These persons would be nominated by the Marine Board. The OFWG would liaise with the existing Marine Board forum for small and medium size vessels (European Research Vessel Operators, ERVO), EFARO (European Fisheries and Aquaculture Research Organisations network) and the Ocean Facilities Exchange Group (OFEG). It should refer to the conclusions and recommendations of the Marine Infrastructures Strategy Group (MISG) report (Academy of Finland, 2003).

The OFWG would be supported by interested agencies.

Jean-François Minster,
Marine Board Chair (2002-2006)
September 2003 (revised January 2004)

Glossary

European Research Fleets gather all the fleets in Europe considered on a national base with their own management features and governance rules whereas “European Research Fleet” encompasses all the Research Vessels and related equipment pools operating and performing on a global scale.

Blue Ocean Research: research undertaken in open seas, oceanic systems.

Rare Equipment: unique equipment costly to maintain and operate.

Passage Time: time spent between two different locations for two different cruises (e.g it represents several weeks in the Pacific or in the South Atlantic Oceans).

Welcoming Platforms: Research Vessel capability to hold heavy equipments such as a ROV or Multi Channel Seismics (MCS).

Executive Summary

For more than a century, ships have provided the only means to access the sea surface, water column and the sea floor for scientific research. Development of satellites and floats has changed this exclusive access to gathering information on the seas and oceans by ships. Nevertheless, Research Vessels and associated equipment are still irreplaceable in providing the huge sets of data necessary to develop the numerical models for climate evolution. Research Vessels are also indispensable when needing to sample the sea floor and servicing the seabed observatories that will play a key role in marine sciences in the near future.

As such, European research fleets represent a scientific infrastructure which needs both national funding and European support. To highlight these facts and to contribute to European research infrastructure integration, the Marine Board decided to create an **Ocean Research Fleets Working Group (OFWG)** composed of national fleet managers. Its mandate was to describe the existing fleets and their management, to submit proposals and formulate recommendations towards enhanced use and improved management at the European level.

The first phase of the OFWG work covered an extensive survey of the European research fleets and large exchangeable equipment. While coherent with past European studies, this survey made the innovative choice to classify the Research Vessels of the European fleets into **three classes**: (i) Regional, (ii) Ocean, and (iii) Global. This facilitates comparison with other fleets and especially that from the United States. Moreover this classification will be of great interest for future strategy and partnerships, and would thus require regular updates and follow-up.

The European research fleets are composed of **46 vessels including 11 of Global class, 15 of Ocean class and 20 of Regional class.** The fleets of Global and Ocean class ships are **up to date** and constitute the essential means for proper access to quality marine data. In comparison with the US academic research fleet (e.g. the UNOLS fleet), **there is no question of overcapacity in the European fleets.**

The main problem with the European research fleets is that of age, especially for the Regional class vessels. As for all infrastructures, research fleets require financial support to be maintained and renewed although available funding is more and more difficult to secure. If renewal is not secured, the number of Regional class vessels could decline by 60% in the next 10 years.

Large exchangeable equipment deployed on Research Vessels has also been surveyed. The European set is clearly **state-of-the-art, performing excellently, and is more extensive than elsewhere in the world**.

There are two existing types of management processes: (i) the peer review process (which assesses the scientific relevance of a proposal for shiptime) and (ii) the global access for scientists to ships. **National authorities** still remain the **main funding bodies** for access to shiptime whereas European Commission contributions remain marginal. Given that this situation is unlikely to change in the near future, it appears that the same National authorities will have to generate the desirable European integration.

The existing partnerships have been also listed and reviewed: they are numerous and highly efficient. Although rare, co-ownership appears fruitful and operational; this most efficient integrative process could be applied to ships as to large equipment for access and purchase.

The second part of the OFWG report is dedicated to the preparation of recommendations, from the near, medium and long-term perspectives.

The OFWG proposes a **tool box** with a suite of pragmatic and complementary instruments so that the existing fleets may be used more efficiently, to widen the access for scientists to research fleets (with special attention towards the new Member States) and to contribute to a long term strategy.

The OFWG concludes that a global and theoretical European management plan would be inappropriate.

To enhance cooperation amongst Marine Board Member Organisations involved in fleet management, recommendations have been developed towards:

– **National authorities**, as main funding bodies, to promote and support co-ownership with the associated long lead time (e.g. three to five years), to launch or to reinforce national equipment pools and to open possibilities to barter/charter national fleets.

– **Marine Board** to promote and catalyse the integration of the use of European fleets; its Member Organisations to find ways and means to enhance coordination of fleets and equipment scheduling, to launch transnational technical teams for deployment of heavy equipment, and to elaborate together proposals, on inter-operability for instance, and to present them to the European Commission.

– **European Union, through the offices of the European Commission**, to promote and secure the research fleets component in the ESFRI (European Strategic Forum for Research Infrastructure) roadmap and in the FP7 specific programmes; to support proposals for new infrastructure projects dedicated for instance to inter-operability;

– **Existing European structures** especially:
  - the OFEG (Ocean Facilities Exchange Group) to become the forum for Global and Ocean class Research Vessels and associated major equipment;
  - the ERVO (European Research Vessel Operators) group to act as the Regional class forum and so to help to safeguard the European Regional class fleets;
  - EurOcean, the internet portal, to be more active for data dissemination concerning present and future research fleets.

The majority of these European structures also participate in the **MarinERA ERA-NET** project, which provides a platform to incubate OFWG recommendations and to initiate their implementation.

In that sense, a step by step process could be launched by a core group of managers to further develop the proposals: the key point is to highlight the efficiency and perspectives of European integration of research fleets.

A. Description of existing fleets and their management

A1. Existing vessels, their present status and foreseeable evolution

A1.1. The existing fleets

A1.1.1. Background information

This first section of the report describes the existing Research Vessels (current status and foreseeable evolution) taking into account the report's European dimension in the domain of academic research outside coastal regions. An earlier report (NatFleet, 2000)[1] describes each existing ship in detail but does not draw any conclusions from these descriptions. At the time of its publication the summary of technical information on Research Vessels was extremely valuable. Nowadays, however, such details can be found in the EurOceanic[2] database (EurOcean internet portal) which indeed served as the major data source for this report.

RV *Meteor*, a Global Research Vessel in the sunset

The 2003 report carried out by the *ad hoc* Marine Research Infrastructure Working Group[3], examines all types of Research Vessels greater than 30 metres, including many coastal Research Vessels. It does not, however, extract specific information or valuable conclusions relating to the needs of academic marine research with respect to multipurpose Research Vessels.

A1.1.2: Objectives of the OFWG study and analytical procedures

In the present report an innovative approach has been chosen to assess the existing fleets.

In the first instance, Section A1 presents the available basic information which is needed to qualify the European academic research fleets capable of working beyond coastal areas. It also profiles the fleets' renewal rate.

To reach this goal, **the OFWG decided to apply specific filters to extract the relevant information relating to its mandate**. The following items were excluded from the present study:

- Ships built/used for local and/or coastal research only;
- Ships not readily accessible to academic research (mostly naval Research Vessels, many fisheries Research Vessels, monitoring vessels of hydrographic services);
- Ships used for educational purposes only.

From OFWG's point of view, the most important criterion for **academic research** is that the vessels must be **multipurpose** (although not all-purpose) because academic marine research in most projects is interdisciplinary and pan-European.

To sum up, the OFWG applied the following criteria necessary to profile some Research Vessel characteristics in the context of this report.

>35 m length: as an indication of the ship's capability to be used at least on a Regional European scale, e.g. the Baltic or Black Seas;

Accessibility for academic research, at least partly on a regular basis. Time for stock assessments, polar supply, naval research, and educational courses and non-academic research are not considered in this context;

Multipurpose (although not all-purpose), i.e. the ship can cover many of the present research fields and technical requirements.

To provide an overview of how European Research Vessels match the above criteria, their size and age, which major capabilities and facilities they have (or do not have), a table, *Multipurpose Research Vessels for Academic Research*, was compiled (see Appendix 1, page 39). This table outlines, in conjunction with the NatFleet report, those Research Vessels by country which match the three above mentioned criteria

One exception is to be noted: in accordance with her known usage profile, the RV *Celtic Voyager* (Ireland), despite her smaller size (31m), is also classed as a Regional vessel in this report.

1 EU project MAS3-CT98-086
2 http://euroceanrv.addition.pt/index.jsp
3 European Strategy on Marine Research Infrastructure (Academy of Finland - 6th report, 2003)

RV *Celtic Voyager*, a Regional Research Vessel

The ships' names, the hosting countries and some basic technical information were extracted from the EurOceanic database. Where available, some general and technical information was drawn directly from the responsible national operators.

The resulting table summarises general features necessary to identify the most important indicators for planning future investments and potential synergies.

These general features are:

– Class

The classification chosen is coherent with that of the US academic Research Vessel fleet operated by University National Oceanographic Laboratory System (UNOLS):

Global vessels are large (>65 m) and currently operate on an at least multi-ocean scale, e.g. RV *L'Atalante*, RV *Discovery*, and RV *Meteor*;

Ocean vessels are large enough (>55 m) to currently operate on an ocean scale, e.g. RV *Le Suroit*, RV *Pelagia*, RV *Poseidon*;

Regional vessels currently operate generally on a European regional scale, e.g. RV *Alkor* (Baltic Sea), RV *Celtic Voyager* (Celtic Seas), RV *Bilim* (Eastern Mediterranean and Black Seas);

– Age

It is essential to give an estimate as to when the ship is likely to be taken out of service and eventually replaced. Normally, this period is **about 30 years**. In some cases a vessel may have undergone a major refit and therefore could be in service for an extended period.

– Accessibility for academic research

Accessibility for academic research in days per year is also essential to estimate present and future requirements on a European scale. This assessment does not take into account times spent for stock assessment, polar supply activity, naval research, student courses and non-academic research. This may also result in estimation of spare time which might be used for research if additional running costs were available, either through basic or through project funding.

– Ships' usual region of research

How many ships are operating in certain regions? This information is particularly important for the Regional class of vessels.

– Major technical capabilities

From a technical point of view, this category describes **the type of research that can be conducted onboard**, e.g. the maximum depth reachable within different fields, the size of the Remotely Operated Vehicle (ROV) or other special capabilities such as the icebreaking capacity, etc.

– Major technical facilities

This category covers non-standard permanently installed, or permanently allocated, large equipment including **mobile equipment**.

The resulting table *Large exchangeable instruments and their foreseeable evolution* (see Appendix 2, page 43), regardless of some gaps, can be used to achieve the goals of the present study; it provides some elements of comparison with the US academic Research Vessel pool (UNOLS) and can generate some general conclusions.

RV *Heincke* loading AUV AsterX during the ALLEGRO cruise, March 2005

A1.2. The present status of the fleets

A1.2.1. Class

CLASS	Europe		US	
	Number of vessels	%	Number of vessels (from UNOLS)	%
GLOBAL	11	24%	10	38%
OCEAN	15	33%	8	31%
REGIONAL	20	43%	8	31%

Table 1: European and US research class fleets

Figure 1 below reveals that the European fleets are composed of **11 Global class (24% of the European Research Fleets)**, **15 Ocean class (33%)** and **20 Regional class (43%)** vessels which are r**un by 19 of 26 European coastal states**[4], all encompassing Member Organisations of the European Science Foundation.

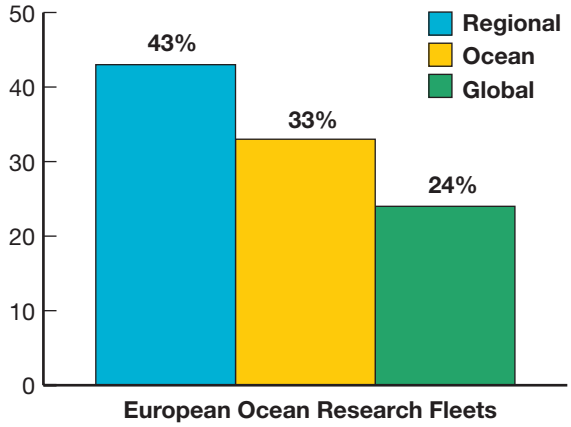

Figure1: European Research Vessels subdivided into three classes: Global (11 vessels, 24%), Ocean (15 vessels, 33%) and Regional (20 vessels, 43%).

The proportion of Global class (24%) and Ocean class (33%) vessels is comparable to those of the USA, which has 38% Global class and 31% Ocean class vessels. The number of European Regional class vessels (43%) is however significantly higher than that of the USA (31%). Taking into account the fact that the European coastline is significantly longer (68000 km) than that of the USA (9700 km), that 11 Regional vessels class are also used for non-academic research, and that the number of US Regional class vessels does not include 15 National Oceanic and Atmospheric Administration (NOAA) vessels which are accessible for academic research, it becomes evident that the European Regional class fleet could not be considered as too large when compared with the US one.

Figure 2 below reveals that the distribution of European Global (24%), Ocean (33%) and Regional (43%) class vessels compares favourably with that of the USA.

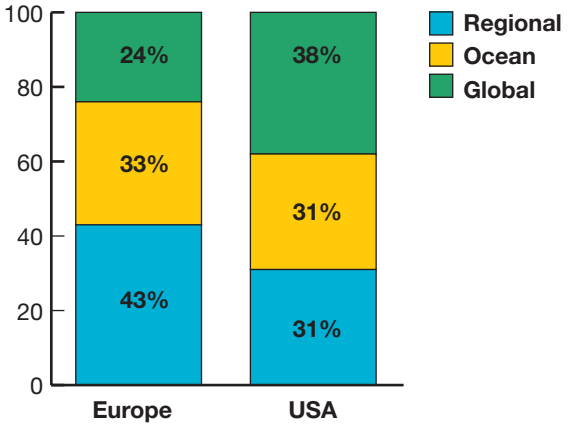

Figure 2: European and US academic research fleets classified into three classes (Global, Ocean and Regional).

It is noteworthy that only large countries such as France, Germany, Italy, Spain and the United Kingdom run Global class vessels, and this poses the question as to how scientists from smaller countries can have access to blue ocean research.

A1.2.2. Capabilities and facilities

These two categories show that the European fleets, at least in the Global and Ocean classes, on average meet international standards with respect to modern equipment handling. This encompasses major capabilities in all fields of research and equipment, e.g. multibeam echo-sounding, coring and handling of ROVs. However, the older and the smaller the ship is, the more seldom these standards are met.

> The European academic research fleets meet high standards in capabilities and equipment; maintenance and improvement of these standards require continual adaptation.

A1.2.3. Regional aspects

All ships classed as Regional perform research in certain areas of European and adjacent waters. As the

4 One candidate country (Turkey), **two associated countries** (Iceland, Norway) and **16 member states** (Belgium, Bulgaria, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Poland, Portugal, Romania, Spain, Sweden, United Kingdom).

RV *Don Carlos I*, a Regional Research Vessel

costs incurred by operating in other regions would be too high, these vessels remain in their region most of the time. In conformation with the European Marine Strategy[5], which has divided European waters into Eco-regions, **this study has defined 12 regions**.

These 12 regions have been designed by taking into account geographical criteria and the fact that the region does not exceed three days of transit sailing time.

In this study, regional aspects applied to Research Vessel operability are considered regarding the number of ships, number of days used, spare days potentially available, and the age of the vessel. This defi-

5 European Commission-Directorate General Environment initiative: it aims to implement regionally an integrated ecosystem approach along with the development of specific ecological indicators

Region	Ship	Country	Age/year in 2005		Days of academic Research		
			Ship	Average in region	Ship	Region	Spare
Greenland					0	0	0
Icelandic shelf and Iceland-Scotland Ridge;	*Saemundsson* [b]	Iceland	35	35	148	148	0
Norwegian shelf & Sea	*H Mosby*	Norway	25	25	100	100	0
Baltic Sea	*Aranda*	Finland	16	17	150	698	20
	Alkor	Germany	15		200		30
	Vejas [b]	Lithunia	25		148		0
	Argos	Sweden	12		200		20
North Sea, English Channel & Celtic Seas	*Heincke*	Germany	15	12	200	560	30
	Belgica [c]	Belgium	19		200		0
	Celtic Voyager	Ireland	8		100		60
	Prince Madog	UK	5		60		100
Bay of Biscay			0	0	0	0	0
West Iberian shelf	*Capricornio* [b], [c]	Portugal	36	35	148	296	0
	Noruega [b], [c]	Portugal	34		148		0
Western Mediterranean	*Universitatis* [b], [c]	Italy	2	14	148	298	0
	Garcia del Cid	Spain	26		150		100
Eastern Mediterranean	*Urania* [c]	Italy	13	18	134	404	0
	Aegaeo	Greece	20		270		0
Black Sea	*Mare Nigrum* [a]	Romania	19	22	60	288	100
	Akademik	Bulgaria	26		80		30
	Bilim [b]	Turkey	22		148		0
Canary Islands			0	0	0	0	0
Azores & Madeira	*Don Carlos I*	Portugal	16	16	30	30	45
Sum (20 ships, 12 regions)			389	194	2.822	2.822	535
Average from 20 ships, 12 regions			***19 y***		***141 d***	***235 d***	***27 d***

Table 2: Distribution of Regional class multipurpose academic Research Vessels in 12 European Eco-regions.

a Average age from first year of service or last refit.
b For these ships, the number of days per year used for academic research is unknown; as a first estimate the average from all other ships is taken, and the spare time set to zero.
c Area expected to be allocated to the ship.

nition should be the baseline for improved operational strategies and an enhanced European cooperation in Regional seas.

Starting from the North, the 12 regions identified (which may partially overlap) are:
- Greenland shelves and continental breaks along Greenland's extremely long coast line (partially overlapping with Icelandic regions)
- Icelandic shelf and the Iceland Scotland Ridge
- Norwegian shelf and continental breaks along the long Norwegian coast line
- Baltic Sea
- North Sea, English Channel and Irish Sea
- Bay of Biscay
- West Iberian shelf and continental break west of Portugal and Spain including the Gulf of Cadiz
- Western Mediterranean from the Strait of Gibraltar to the Strait of Sicily
- Eastern Mediterranean from the Strait of Sicily to the Straits of Dardanelles
- Black Sea and connecting belts to the Mediterranean
- Canary Islands
- Azores and Madeira archipelagos.

Extracting information from Appendix 1 page 39, Regional class vessels are allocated to their region where they are known (or expected) to perform their major work (Table 2).

Despite its uncertainties, Table 2 presents some interesting aspects as follows:
- Within the scope of the definition, the two regions that do not host Regional class vessels at all (Greenland and the Canary Islands), are at the same time, open ocean areas. **It is therefore suggested that research in these areas is probably covered by Ocean class ships.**

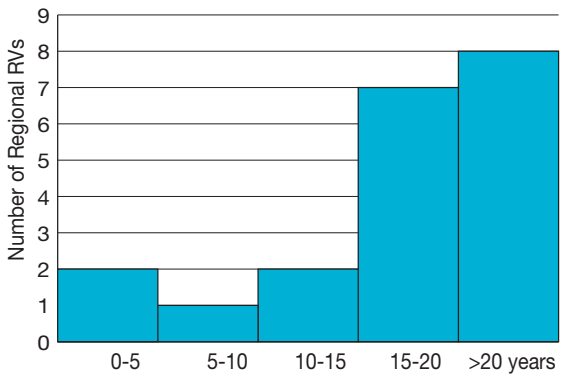

Figure 3: Age of the European Regional research fleets in 2005

© FIMR

RV *Aranda*, a Regional Research Vessel in the Baltic Sea

- The **average age of the Regional class ships in 2005 is 19 years.** This figure already exceeds the nominal average age of 15 years by more than 30% (see Section A1.3). Only three of the 20 Regional class ships are less than 10 years old (RV *Universitatis*, RV *Prince Madog*, RV *Celtic Voyager*), but almost half of the Regional class fleet (nine ships) is at least 20 years old at least. In only two regions, the average age is slightly less than the nominal average age of 15 years because two ships involved are quite recently built: the European Regional class fleet is quickly ageing.
- The **average number of days per year used for academic research is 141 days**: one month being the minimum and about 270 days the maximum. Reasons may be diverse: in Northern countries for instance, a spare time of less than 60 days may be simply interpreted as winter time. It is also possible that some Regional vessels are used for other purposes such as education and training of students or monitoring. Four vessels at least could be used for two months or more per year if funding were available: the rather new RV *Prince Madog* (100 days) and RV *Celtic Voyager* (60 days) in the Celtic Seas, the old but refitted RV *Mare Nigrum* (100 days) in the Black Sea, and the rather old RV *Garcia del Cid* (100 days) in the Western Mediterranean.

The above findings clearly require rapid reaction and political decisions in order to maintain regional focused research with high quality standards.
There is:
- a need to detail identification of lack of funding for running costs for existing but unused valuable infrastructure;
- a need to take decisions to build new Research Vessels in the Regional class in all regions.

A1.3. Age of the fleets and its foreseeable evolution

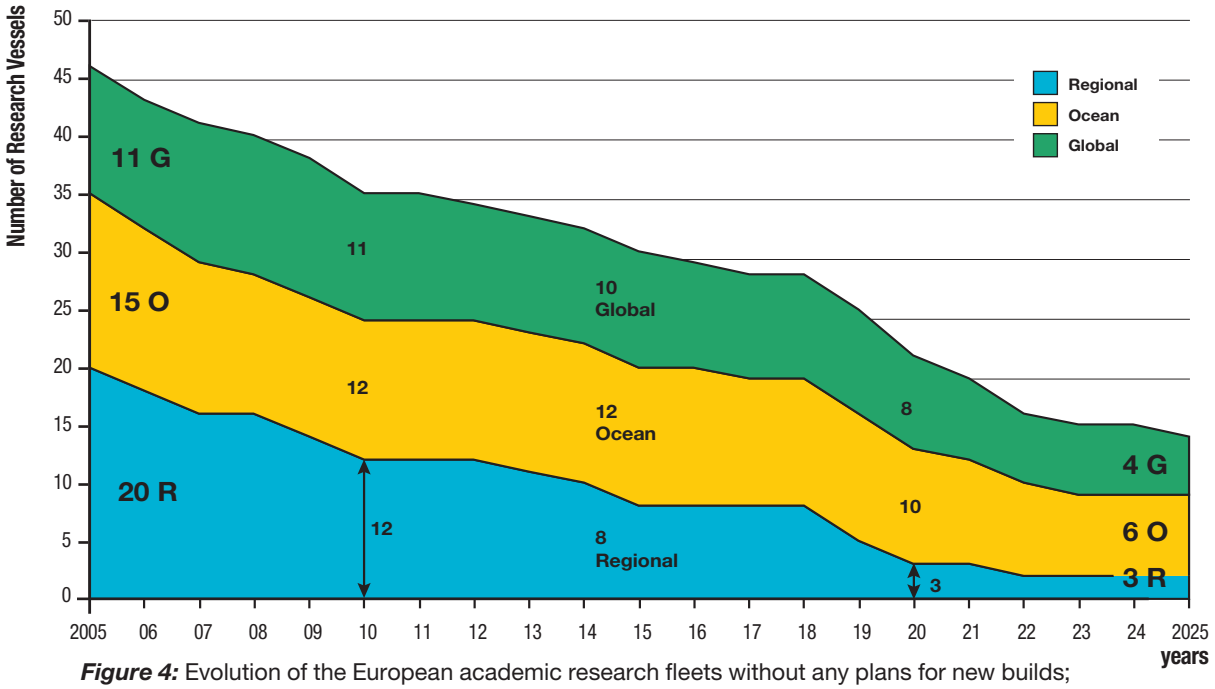

Figure 4: Evolution of the European academic research fleets without any plans for new builds; in about 20 years the fleet will be reduced by 70%.

RV *James Cook*, a Global Research Vessel

Since 2006, the RV *James Cook* (UK) has replaced the RV *Charles Darwin* (Ocean becomes Global class) and in 2007 the new Spanish RV *Sarmiento de Gamboa* (Ocean Class) will be operational.

The lifespan of the current European academically used Research Vessels is shown in Figure 3 and it includes currently committed construction of new ships. Assuming a lifetime of 30 years for a Research Vessel, the future of the European research fleet is projected, considering that no plans for refit or renewal are known.

Assuming that all major refits or plans for new vessels to be in service until 2010 are known, it is possible to summarise that:

- Global class: the number of Global class vessels (G) will stay at 10 until 2010, and beyond until approximately 2015;
- Ocean class: the number of Ocean class vessels (O) will decrease from 15 to about 12 until 2010, and beyond until approximately 2015 if no further commitments are made;
- Regional class: Regional class vessels (R) are in danger: their number will dramatically decrease from the current 20 to 12 in 2010, to 8 in 2015 and many fewer (3) until 2025 if renewal and/or major refit are not started now.

A2. Description of existing large exchangeable instruments and their foreseeable evolution

A2.1. Background

Marine research requires a wide variety of equipment and instruments. Some are **fixed** to a particular vessel (e.g. sensors such as echo-sounders, sonars, Automatic Doppler Current Profiler [ADCP]), whereas other, **portable systems**, are taken onboard for particular types of cruises. Such portable equipment can be divided into different categories:
– geology and geophysics
– submersibles
– laboratory containers
– towed vehicles
– seabed survey
– seabed observatories
– portable winches.

These represent sophisticated, expensive and infrequently used instruments. Therefore, they have the potential for common ownership and/or use by several research institutes all over Europe. However, there are specific constraints linked to their deployment. Some of them can be easily deployed onto other Research Vessels whereas others need specific platforms and associated trained technicians.

For matters of comparison, Europe owned in 2005 three ROVs and one AUV whereas the US and Japan own each one ROV and one AUV.

A2.2. European inventory of large, exchangeable instruments

Because there is a very large number of instruments for marine research with different capabilities and of different use in Europe, a cursory survey of such instruments has been achieved so far. However, the information gathered is sufficient to establish **a picture of the current situation regarding large, exchangeable instruments in Europe** (see Appendix 2 page 43).

A2.3. General results of the survey

– The survey shows that a **limited number of countries own most of the large and exchangeable instruments.** There is no formal system or mechanism in place for lending or leasing equipment between European institutions, except for that between the members of the Ocean Facilities Exchange Group, a bartering system between six European institutions (OFEG, see Section A4.2.1.).
– **Lending, leasing and/or exchange of instruments between European institutions does happen, most often on a bilateral case-by-case basis.** Regarding this unexploited potential, this is a window of opportunity to better utilise and share the instruments across Europe. Adequate mechanisms in support of adapted barter systems or financial arrangements could be further developed with an extensive use of existing networks, databases and more visible tools showing available shiptime across Europe.

ROV Quest on board RV *Meteor*

Submersible Thetis

– **The survey reflects that the availability of less capable instruments is sufficient and that the availability of the more sophisticated capable instruments, on the contrary, is very limited and unevenly distributed.** For example, the number of countries owning 2D seismic equipment, gravity corers, shallow water ROVs, general container labs, towed vehicles, multibeam echo-sounders, and portable winches is quite large whereas only a small number of countries own 3D seismic equipment, piston corers, ocean bottom seismometer (OBS), manned submersibles, deep water ROVs, specialised container labs and seabed observatories.

A2.4. Other findings

The potential for an enhanced use of large and exchangeable instruments in Europe is considerable. Nevertheless, in order to achieve the objective of an enhanced use of this pool, many issues need to be considered; some may be barriers to a user group willing to use instruments owned by a different group, located on another vessel.

These issues are:
– Interoperability
– Technical support
– Annual programming
– Cooperation outside Europe
– Insurance
– Transport and customs

A2.4.1. Interoperability

Installing such instruments on a vessel which is not primarily adapted, often requires technical adaptations of the vessel including steel works, cabling and even the moving of other fixed installations on board. It can also be necessary to increase the stability of the vessel before the instrument can be put onboard. This means that the installation and use of such equipment is not always an easy task and requires a lot of coordinated planning, preparation and effort. This is always the limiting factor, or even worse, the deciding factor when loan, lease or bartering of instruments is attempted. The vessel itself requires logistical adaptation and transformation (e.g. computing systems, positioning capabilities, heavy overside lift capabilities, etc.).

If the different Research Vessel operators and instrument owners are able **to plan and coordinate their procurement of vessels and instruments in an improved manner**, these problems can be reduced and in some cases can vanish.

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RV *Sarmiento de Gamboa*, the new Spanish Ocean Research Vessel (length: 70m), will be in operation in 2007; she can take onboard Victor 6000

Increase the availability and thus the productivity of any given research cruise by deploying several instruments.

A2.4.2. Technical support

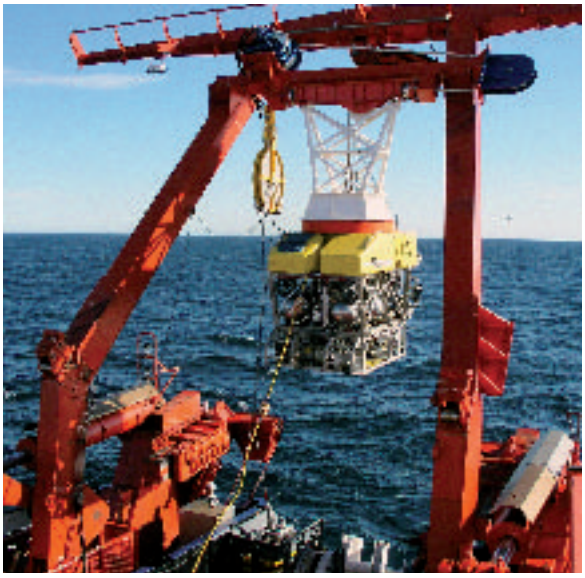
The instruments being built and deployed for marine research **are becoming more and more technically complex and sophisticated. As such, they require very skilled operators and technicians to prepare, operate and maintain them.** Because it is very costly and time consuming to train technicians, the lack of such personnel can be the limiting factor to using these instruments on a yearly basis.

Mapping the technical expertise in operational oceanography will greatly facilitate the operability and the use of instruments.
Because there are few technical experts in the field, initiatives have to be developed to facilitate exchange schemes and foster the creation of joint national teams.

© NIOZ

Calypso Long Corer on RV *Marion Dufresne*

© Ifremer



An example of interoperability: ROV Victor 6000 on board RV *Polarstern*

A2.4.3. Annual programming

The agencies from different European countries have different planning horizons. Some countries plan in detail two or even three years ahead whereas others need only one year. This makes it difficult to commit facilities for pooled use when domestic requirements have not yet been fully established. Some progress was made recently when it was agreed to accept the calendar year (January to December) as the yearly unit programme duration. Operators now need to extend this timescale **to two year programmes in order to provide an opportunity to plan equipment exchanges**. Data utilisation for each instrument also has to be produced and made more widely available in order to identify potential spare capacity. The European Research Vessel Operators group (ERVO[6]) would be an appropriate forum to develop this topic further.

A2.4.4. Cooperation outside Europe

European fleet managers work closely with non-European partners such as Australia, Canada, China, India, Japan, New Zealand, the United States of America and others through the International Research Ship Operator Meeting (ISOM[7]) group that has existed for almost 20 years. This cooperation shows that some institutions outside Europe own and operate instruments and equipment which can be used and may be needed by European institutions as well.

Bilateral agreements between European and non-European institutions regarding large and exchangeable instruments already exist; such cooperative arrangements are likely to be increased in the future.

A2.4.5. Insurance

European governments have different approaches regarding the insurance of equipment. Some owners get regular insurances on all types of equipment. Therefore users have to pay only for the insurance of the related equipment to facilitate a lend or a lease. Other owners are not allowed to insure their equipment with a private insurance company and must therefore pay for the replacement of lost equipment (out of their ordinary budgets) or ask for an extra grant from the owner of the institute. In these cases, the willingness to lend or lease expensive instruments to others is often, not surprisingly, very limited.

A common policy for the insurance of large and exchangeable instruments across Europe would therefore be most welcome.

A2.4.6. Transport costs and customs duties

Moving large instruments over national territories is also a very complex, time-consuming and costly operation. Joint ownership and common use of instruments should therefore be encouraged between countries where the cost for transportation appears reasonable. Another challenge concerns customs duties and the Value Added Tax (VAT) issues when equipment cross-

6 ERVO: Marine Board-ESF Working Group since 1999
7 ISOM: www.isom-info.org

es national waters and when it is shipped back to its home country. The operator has to make plans well in advance to ensure it is cost effective. Any European vessel operator should be aware of any other plans well in advance in order to foster potential synergies between scheduled plans.

Facilitate and develop joint procedures (legal and financial) in order to share the costs of transportation.

A2.5 Conclusions

– **Large and exchangeable instruments are unevenly spread across Europe** and **the potential for joint ownership and the use of such instruments is still very large.**

– There is however a number of factors to consider before setting up such joint ventures to ensure cost efficient initiatives.

– **The trend is clearly towards more capable, autonomous and sophisticated instruments** (higher precision and multitasking applications) able to collect huge amounts of data a greater depths with AUVs or to map the seabed in real time. This equipment will become heavier (e.g. Lander, ROV, observatory), deployed precisely at a specific location. The vessel will also require technical adaptation.

– There is no doubt that **AUVs will also be an important element for the future**. Current technical developments are aimed at units which can travel to full ocean depth. The intention is to ultimately have a set of instruments which are all deployable during any given cruise, thereby increasing the productivity of that particular research exercise.

– The adverse trend is also that the use and maintenance of such equipment imply the need for even more money and very highly skilled and trained operators and technicians. Therefore, **the European technical expertise should be mapped and procedures to facilitate personnel exchange across Europe should be encouraged and developed.**

– The potential for increased science for the same amount of money is therefore extremely large if the **marine research institutes in Europe are able to improve the coordination of procurement, use and maintenance of instruments**. With suitable systems and networks such as OFEG, ERVO and their inputs to database such as those developed by EurOcean, Europe already has all the necessary mechanisms to:
  – **Collate and disseminate information,**
  – **Provide a *trading house*,**
  – **Develop and implement a future marine infrastructure policy.**

© Ifremer

AUV *AsterX* in operation

A concerted and resourced effort is needed to properly establish and agree their *Terms of reference* at the European level. These groups would then be appropriately empowered to carry out their respective but interfacing remits.

RV *Polarstern,* a Global Research Vessel

A3. Description of present management processes

The main issues regarding the management processes are:
– Application for and granting of shiptime procedures with their timing;
– Referee and ranking procedures;
– Funding procedures;
– Scheduling procedures and deadlines;
– Bartering systems;
– Technical support before and during research cruises;
– Post-cruise assessment;
– Funding new or replacement of Research Vessels;
– Equipment pools.

In order to get insights into the management processes of the different European fleets, a questionnaire was sent to all members (see Appendix 4, page 46).

An inventory was also made of the number of ship days used for European Union Framework Programme funded research projects that were paid for by national funding and the number of ship days that were funded by the projects itself. This could give insight into the influence of European Union Framework Programme funded research projects on shiptime usage of the European research fleet (see Appendix 5a page 48). An assessment of available shiptime that is not used because of lack of funding can be derived from the inventory of the European academic research fleet in Section A1 (see Appendix 1, page 39).

A3.1. Observations

A3.1.1. Timing and deadlines

Global class Research Vessels that operate worldwide have longer deadlines and a more international peer reviewing or ranking system than Regional class

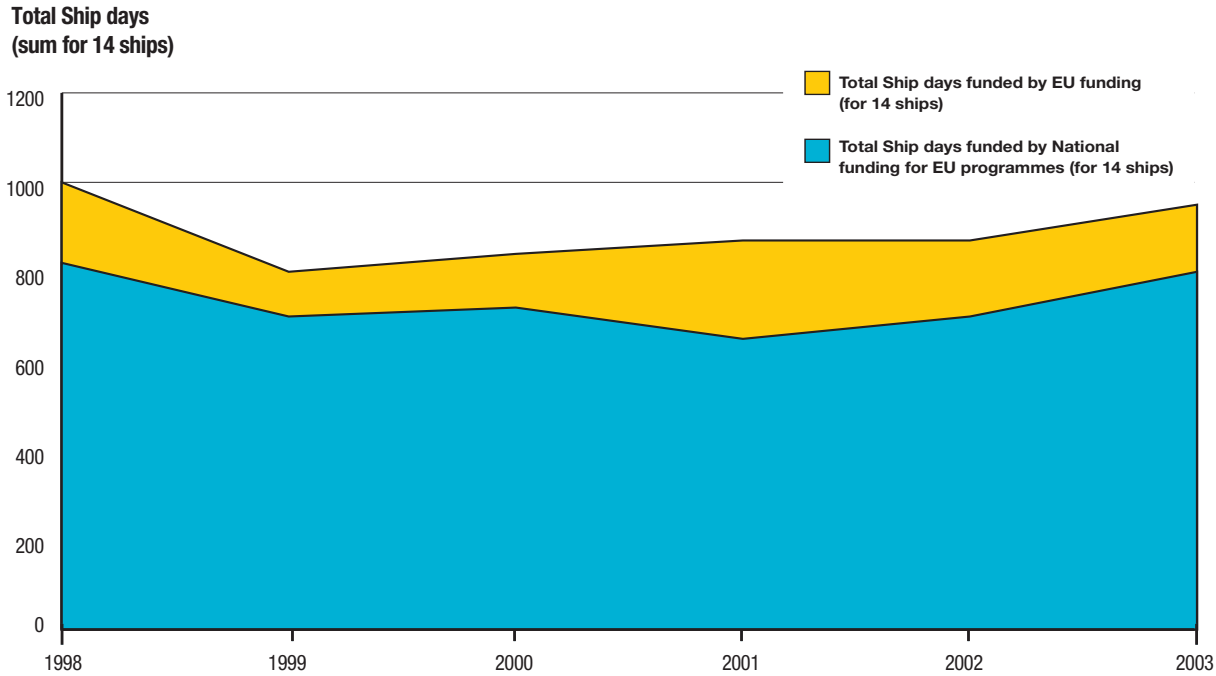


Figure 5: Influence of European Union Framework Programme funding on shiptime usage: over 80% National funding versus less than 20% European Union Framework Programme funding.

Research Vessels which have mainly national tasks. Ocean class Research Vessels can present both features (see Appendices 5b page 49 and 5c page 50).

A3.1.2. Grant systems

European countries that own Research Vessels available to the academic science community differ in their ways of funding the coverage of the running costs of Research Vessels (see Appendices 5d page 50 & 5e page 51). In the case of large countries with a large research fleet, running costs of the research fleet are fully or partly covered by specific funding from their government or the specific research council/institute. There are, however, other countries with smaller research fleets or with only one Research Vessel, whose running costs are not fully guaranteed by public national funds. The implication is that these vessels are under funded and that funds have to come from other sources, for example through commercial charter work.

A3.1.3. European Union Framework Programme funding

Some European countries spend a large part of their funds for shiptime to facilitate European Union Framework Programme funded research projects. It would seem reasonable to expect this shiptime to be financially supported by the European Commission, quod non. The European Union Framework Programme rules for shiptime funding have to be clarified and applied in a consistent way. Furthermore, the size of funding, as a limited percentage of the total project costs, may be reinvestigated (see Appendix 5a page 48)

A3.1.4. Bartering systems

Bartering systems on an international (European) scale are described in Appendix 3 page 45.

A3.2. Conclusions

– Two different funding systems for shiptime supported by grants can be discerned (see Appendix 5d page 50):
  1– A system where shiptime is granted in number of ship days plus the money to cover the daily rate for the ship to be used.
  2– A system where shiptime is granted as a right to use a number of ship days (where the costs per ship day are covered via another route).

System (2) is always in place with European countries that own and manage larger fleets. System (1) may result in a financial risk when the ship owner/operating organisation has to bear any deficit in running costs.

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Technicians and crew at work

– **Scheduling timing and deadlines show wide differences**, often, but not always, **related to the size of the ship and its operational area** (see Appendix 5b page 49).

– Technical support before and during cruises is mostly provided by a dedicated body or separate organisation belonging to the ship owner/operating organisation. However, there are a few exceptions where scientific groups have to take care of the technical support themselves (see Appendix 5f page 51).

– **Most European countries have a post-cruise assessment system in place**, though it may have many different forms and different requirements (see Appendix 5g page 52).

– **All European countries need their governments for the funding of new or replacement of existing Research Vessels** (see Appendix 5h page 52).

– **Only a small number of European countries have an equipment pool in place with structured long-term planning** (see Appendix 5i page 53).

– **The creation of a virtual pool of Research Vessels such as the OFEG system** encourages the harmonisation of the timing and deadlines of application, the allocation of shiptime and the scheduling procedures.

A4. Existing partnerships in Europe

A4.1. Introduction

Investments in marine research throughout Europe seem not to increase or even decrease compared with other research fields. To face that financial issue, **different cooperation schemes in Europe exist on different levels, formal and informal, to act effectively towards an enhanced use of resources**.

Such cooperation has mostly been initiated when:
- Large investments and resulting running costs could not be realised on a national basis only; e.g. shared investment and running costs for RV *Thalassa* by France and Spain.
- Bilateral or multinational political interests encouraged such cooperation; e.g. shared investment and running costs for RV *Alliance* by some NATO members.
- Existing large equipment, e.g. Research Vessels, are forced to be used more efficiently by national controlling mechanisms (German vessels within the Ocean Facilities Exchange Group, OFEG).
- Scientific and/or technological interests on a bilateral or multinational basis are the driving forces (NERC/UK and the NSF/USA; IMR/Norway and the Marine Institute/Ireland; AWI/Germany and Ifremer/France).

A4.1.1. No-cash-flow exchange: the barter system

In barter systems, existing partner's infrastructures (e.g. ships, large equipment) **are financed and provided by the owner on loan to the partner for a certain period of time.** In turn, the owner receives the right of usage of the partner's infrastructure in the near future. The value of single-case usage is generally counted in *points per day* and balanced out on an annual scale. Clearly, such a system can work only for partners who own and can make available infrastructure which is of value to others, either because others do not own or need the infrastructure or because their infrastructure is not available at a certain location at a certain period of time. This system allows for a more cost effective use of existing infrastructures. Such barter systems can easily be initiated between partners who own specific infrastructures; candidates who do not own such infrastructures are excluded from them.

A4.1.2. Shared investments and running costs

Such systems are initiated if a single partner needs infrastructure but cannot afford, or is not willing, to pay the necessary investment and/or running costs on its own. This partner might also not be able to use the infrastructure effectively and sufficiently. The advantage is that costs can be individually adapted to each partner according to its specific needs. They are scheduled on a long-term scale. Such a system needs a partner who acts as the **lead body**. Money flows from all partners to the acting partner and in turn, partners have access to the infrastructure according to their contribution and on individually based case agreements. The disadvantage appears to be that it is difficult to leave such partnership after the programme has ended.

A4.1.3. Charter contracts

This is the classic model used in the merchant fleet. It has been applied many times within the field of academic research. **In this system, owners of infrastructure are not only public institutions but also private companies. They contract their infrastructure against cash-flow.** Contracts concern individual cruises on a certain vessel or on a long-term scale, e.g. a certain amount of days per year for several years as well. While the model principally provides much flexibility, researchers as charter clients depend on the market with respect to type and quality of infrastructure, prices and availability.

A4.1.4. Joint projects/programmes

In joint projects, partners may agree to share infrastructure. The time period of the agreement is generally limited to the project's lifetime. Common cruises during a project are an example. Usually, no cash flows between partners. On a broader and longer scale, programmes may provide information on available and planned infrastructure and may initiate future research programmes jointly by funding agencies. As a general basis, a Memorandum of Understanding may initiate cooperation between partners; e.g. aiming at getting optimal training on complicated infrastructure.

A4.2. Description of existing partnerships
(see examples Appendix 3 page 45)

A4.2.1. Exchange of shiptime or equipment or instruments: the barter system

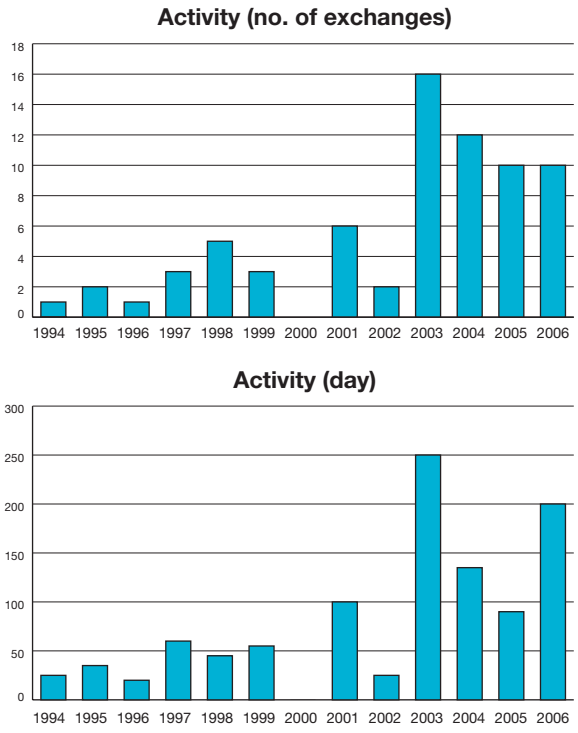
The **Ocean Facilities Exchange Group (OFEG) consists of six European institutions and ministries (Ifremer[8]/France, NERC[9]/UK, BMBF[10]/Germany, NIOZ[11]/Netherlands, IMR[12]/Norway, CSIC-UTM[13]/Spain)**. It runs a system which announces opportunities such as vessels' bartering time and offers of use of large equipment. The agreement, signed in 1996, has

8 Institut Français de Recherche pour l'Exploitation de la Mer
9 Natural Environment Research Council
10 Bundesministerium für Bildung und Forschung
11 Nederlands instituut voor Onderzoek der Zee
12 Institute of Marine Research
13 Consejo Superior de Investigaciones Científicas - Unidad de Tecnología Marina

been based on an equivalent point by day and it works quite efficiently (see Figure 6 below).

The system encompasses:
– All eight non-polar Global class European vessels,
– 12 of 15 Ocean class European vessels,
– Equipment (ROVs, multichannel seismic systems, multibeam echo-sounders etc.)

The exchange of points occurs on a several year basis. As no extra time can be allocated in the long run, the system involves only partners who are willing to share their own equipment with others.



Figures 6&7: Ocean Facilities Exchange Group (OFEG)'s activity showing the number of exchanges and of exchanged days (extracted from http://ofeg.nerc.ac.uk).

The early years of OFEG from 1996 to 2002 facilitated the development of trust. The number of exchanges was already significant (representing about 50 days at sea per year) and cost effective. No joint cruises were run and equipment exchange was limited to seismic compressors. A single annual meeting turned out to be insufficient to achieve shiptime exchanges on a larger scale. In 2001 a second annual meeting (in spring) was launched resulting in, as of 2003, an increase in exchanges and exchanged days (up to 250 days at sea). Also, joint cruises were initiated and equipment exchange developed together with the exchange of technicians.


© Erik Ask

RV *G.O. Sars*, an Ocean Research Vessel in Bergen: the Institute of Marine Research (Norway) has joined the OFEG in 2006

Since the mid-1980s a similar agreement has run successfully on a bilateral basis between NERC-UK and NSF-USA and since 2005 between NERC-UK and the IMR-Norway[14].

A4.2.2. Shared investments and running costs

In the past, investments were shared in some few cases on the basis of bi- or multilateral international agreements. One of the reasons was that the costs of investment appeared too high for a single country and/or the resulting annual running costs were too high compared with the expected annual use. Another reason, more political, was to foster cooperation between two counterpart scientific institutions or to address together sensible societal challenges.

Two known and operational examples are:
– RV *Thalassa*, co-investment and running costs shared by France and Spain.
– RV *Alliance*, co-investment and running costs shared by several NATO member states.

So far, there is no recent European Union funded or co-funded investment known. However, plans have been made amongst Member States to jointly consider plans for the building of new research infrastructures and to get, through the ESFRI list of opportunities[15], European Union support to fund preparatory and implementation phases:
– A new polar drilling vessel, RV *Aurora Borealis,*

14 www.nerc.ac.uk/funding/marineplan/tripartitebarterarr.shtml
15 http://cordis.europa.eu/esfri/home.html

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RV *Thalassa*, an Ocean Research Vessel

© NERC

TOBI, a seafloor mapping system

planned by the European Polar Board-ESF and the European Scientific Committee for Ocean Drilling (ESCOD),
– The EMSO initiative (European Multidisciplinary Seas Observation) built upon the ESONET project (FP6 Network of Excellence) I

The proposed future BONUS-169 joint programme requires agreements and mechanisms to be established to permit comprehensive access to and mobilisation of shared infrastructure and facilities, including Research Vessels, in a cost-effective manner at the pan-Baltic level.

Investment and running costs appear to be mainly funded by National authorities: the total number of days at sea funded by the European Union Framework Programmes is thus relatively low.

A4.2.3: Chartering within Europe

For funding agencies or users who do not need vessel/equipment time on an annual basis, running costs can be reduced to an optimal level by chartering available time. This can occur at different levels and time scales. Many examples exist for long charter cruises, in particular charters from other European academic Research Vessel operators; e.g. the charter of RV *Pelagia* (NIOZ) by the University of Southampton (UK) in 1998 and 2001 for geophysical cruises using TOBI[16], and by the University of Hamburg in 2004 for a geophysical cruise using DTS-1[17]. An example of long-term charter involves the RV *Sonne*, which has been contracted by the German Federal Ministry of Education and Research (BMBF), for seven years until 2010 for an average annual use of 250 days.

A4.2.4. Joint projects/programmes

Within joint projects, joint cruises and use of equipment without exchange of money or barter values are quite common. The funding agencies recognise that marine science, although being funded nationally, is best performed in an international context. Examples include many multinational and interdisciplinary cruises for WOCE, JGOFS[18] and EU-funded projects (e.g. CANIGO on Research Vessels *Discovery*, *Meteor*, *Hesperides* and *L'Atalante*). Also, on a bilateral basis, two institutions may agree to share the use of large equipment without exchanging money or barter points. One example is past and future joint cruises of Ifremer and AWI using ROV *Victor 6000* on RV *Polarstern* in polar seas. However, in the future, pressure from national controlling mechanisms may arise for a more cost-sharing basis for joint cruises.

A broader aspect than a single project involves the Memorandum of Understanding (MoU) signed by the Marine Institute (Ireland) and the Institute of Marine Research (Norway). This MoU aims at improving skills and experience in marine science and associated techniques by scientific cooperation, training of personnel, collaboration in using shiptime and identifying best practises in Research Vessel operation. On the European level, two important initiatives, BONUS (EU Framework programme 6, ERA-NET project) and MarinERA (EU Framework programme 6, ERA-NET project), have been implemented.

16 TOBI is a seafloor mapping system that uses a 30 kHz deep-towed side-scan sonar and 7 kHz sub-bottom profiler. TOBI is owned by NERC and operates in water depths between 200 and 6,000m.

17 DTS-1: Deep-Towed Side-scan sonar system owned by IFM-GEOMAR for deep-sea research studies;

18 World Ocean Circulation Experiment & Joint Global Ocean Flux Study

They aim at:
– Identifying and describing available marine infrastructure and future needs;
– Identifying and co-ordinating the needs for future marine research programmes in Europe.

The **BONUS project**[19] has carried out the identification of regional future needs and resources in marine research around the Baltic Sea. It presents Baltic marine infrastructures and aims to define future scientific projects that may be worth jointly funding by the agencies involved. It has been suggested to investigate whether a regional barter system should be established and also if joint investments for a coastal multipurpose (Regional class) Research Vessel should be initiated to replace the ageing coastal fleet in the Baltic Sea.

On a broader geographical level, the **MarinERA** project[20] aims at facilitating the coordination of national and regional RTD marine programmes in Europe and at identifying infrastructure needs in support of future key marine programmes. The MarinERA infrastructure strategy aims to assess complementarities among different issues (financial, management and networking) in different infrastructure fields including large equipment.

The **SeaDataNet** project[21] (EU Framework Programme 6, Integrated Infrastructure Initiative 2006-2011, see figure 7 below) is constructing a standardised distributed system for managing the large and diverse data sets collected by the ocean research fleets and the new automatic observation systems. The objective is to network and enhance the currently existing infrastructures, which are the national oceanographic data centres and satellite data centres of 35 countries, active in data collection. The networking of these professional data centres, in a unique virtual data management system, will provide integrated data sets of standardised quality on-line.

A4.3. Conclusions

There are several well established cooperative systems in Europe, namely **barter**, **shared investment/running costs** and **joint project/programmes**. They act as a facilitator for marine research, supporting synergy, developing capacities and capabilities, promoting integration between initiatives and catalysing approach to research management and funding structures in Europe. They could furthermore act as a catalyser for enhanced financial support from the European Union and National authorities' interests. New regional barter systems, new co-invested Research Vessels and large equipment, and new initiatives for joint projects and programmes will thus certainly be an important step to improve high European standards in marine research. Dedicated European call for multinational cruises could then facilitate the development of joint projects/programmes, and lead to a global assessment of European multinational cruises.

19 www.bonusportal.org
20 www.marinera.net
21 www.seadatanet.org

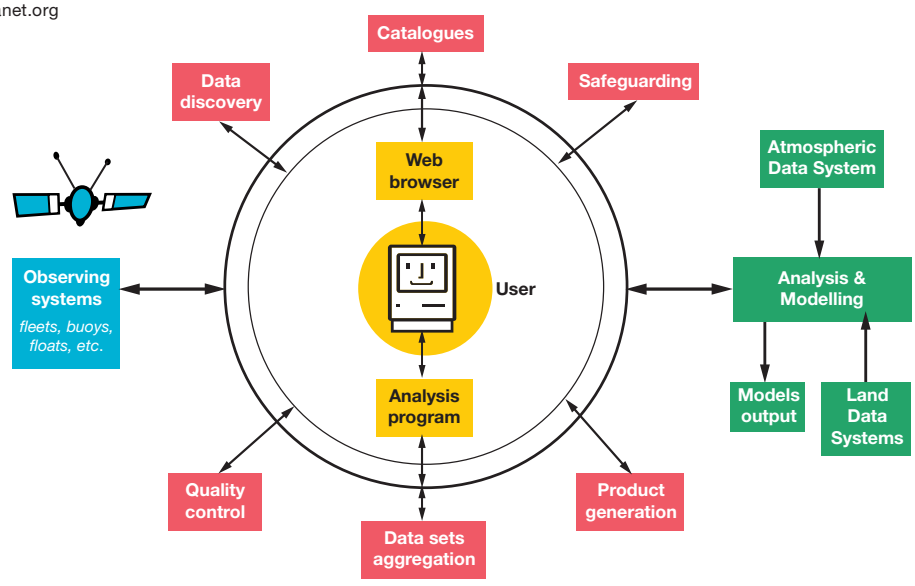

Figure 8: The SEADATANET Network

B. Recommendations for an enhanced European ocean research fleet and its management

The main points from Section A are:

– For the first time, **European fleets are described as a whole**, using significant indicators.

– **Up-to-date information** has been obtained, though incomplete. The missing information mainly concerns the available shiptime.

– The chosen **ship classification (Global, Ocean and Regional classes) allows easy comparison with the rest of the world**.

– For the first time **an overview of heavy, portable equipment is available**: it shows a strong concentration of rare and heavy equipment handled by few owners (six) and a wide distribution of the lighter equipment.

– **Many successful partnership schemes** have been described and they demonstrate good standards of cooperation within the European fleets.

– **Investment and running costs appear to be mainly funded by National authorities and the total number of days at sea funded by the European Union Framework Programmes is low.** The creation of a new European body dedicated to oceanographic fleets seems, on this basis, unrealistic. Using the national flag on European Research Vessels could also explain the strong involvement of National authorities together with application of the subsidiarity principle[22].

22 The principle of subsidiarity regulates the exercise of powers. It is intended to determine whether, in an area where there is joint competence, the European Union can take action or should leave the matter to the individual Member States. Compliance with this principle may be monitored either politically or legally. Taken over into EU policies, it is used as an instrument for determining when the EU is to act in areas not coming under its exclusive competence.

B1. Enhanced means of using the European fleet more efficiently and the methods necessary for implementation

B1.1. How to use the existing fleet more efficiently

The Ocean Research Fleets Working Group (OFWG) has chosen to focus mainly on well-known operational aspects. Since all members of the OFWG are engaged in research fleet management, the recommendations are pragmatic and easily applicable.

B1.1.1: Recommendations concerning ships

Enhance coordination of fleet scheduling.

Current funding regimes may slow down long-term planning:

– For Global and Ocean class vessels, annual (year-by-year) scheduling is an obstacle to shiptime exchange. Sliding two-years' scheduling plans may be necessary to foster exchanges.

– For the Global class vessels, the lead time for programming may be even longer because of heavy logistics, often associated with polar cruises.

Promote bartering to avoid long passage time between cruises.

Barter systems allow partners to reduce the transit time of cruise programmes by the mobilisation of partners' vessels that are already in the region of interest. In addition, members of barter systems promote and concentrate science programmes, planned for the same region, onto the same vessel. They thus avoid the mobilisation of different vessels for the same purpose.

Encourage chartering processes to use the non-funded time.

The primary condition for chartering is that free time slots and applicable fees are known by possible charter clients sufficiently well in advance to collect and secure the necessary related funds. The two-year-lead time would favour this approach.

Create a "scrap premium" to get rid of old and under-utilised vessels.

The associated funds could also be used to charter modern vessels with improved efficiency for the scientific community.

B. Recommendations for an enhanced European ocean research fleet and its management

Airgun arrays for seismic studies

AUV *AsterX* on board RV *Meteor* during BIONIL cruise November 2006

B1.1.2. Recommendations concerning equipment

Enhance coordination of equipment scheduling.

Equipment such as ROVs, seismics and towed sonars represent very heavy loads (20t-100t). Their transportation to the vessel and back can take from a few weeks to several months. Nevertheless, transport of equipment to the ship is cheaper than passage time of a support ship which would be used solely to embark equipment.

A two-year-lead time schedule is recommended to properly achieve preparation of heavy equipment for scientific cruises, especially when it necessitates important vessel adaptation for that purpose.

Achieve interoperability of equipment.

Interoperability refers to the ability, within a minimal timeframe and with limited financial investments, to safely deploy equipment from one vessel to another.

Various levels of interoperability could be achieved:

– Payloads
For ROVs, manned submersibles and AUVs, a few specific payloads exist: they are available only in some countries and are rarely used (once or twice a year). As interfaces are not yet standardised, the exchange of such payloads is difficult and expensive. A first objective could be to adapt present payloads to standard interfaces and to agree on these interfaces for all newly developed payloads.

– Enlarging/increasing the number and flexibility of welcoming vessels
Such an action will guarantee that any European ROVs could be easily launched from several European ships (two to five). Such flexibility would avoid unnecessary transit times and/or transport costs.

– Widen access to rare equipment
In order to foster integration, it is recommended that some under-equipped countries are facilitated to access modern and efficient equipment, either by bartering or by chartering systems.

Transnational deployment teams.

Heavy equipment is currently run and maintained by highly specialised national teams. Each country has only a few trained teams, which limits the availability of specialised teams at sea. Training additional deployment teams to cover possible needs of partners seems to be unrealistic. For lighter equipment, the accompanying specialists are often either well-trained technicians or post-doctorate researchers; ensuring the continuity of service is still a major issue. It is recommended that the open-access of equipment to transnational teams must be facilitated and deployed. A first step to foster such an exchange could be to convene a national core team to another country's trained personnel and extend the availability of such equipment at sea. This would facilitate exchange by decreasing the direct cost of such an operation (partly supported in personnel costs rather than in cash, or by points in the case of barter), and would globally extend availability of European equipment at sea. In a further step, the core team could be reduced, opening the way for well-balanced co-acquisition of equipment.

Sharing of spare parts.

As pointed out in Section A2, several national equipment pools encompass the same type of equipment

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RV *G.O. Sars*, an Ocean Research Vessel on cruise in the Barents Sea

(e.g. coring systems, seismics, and exchangeable multibeam echo-sounders). It is then recommended that a sharing system for heavy spare parts should be established between volunteering partnership with similar equipment ownership. In the first instance, the development of a suitable inventory gathering available spare parts would be useful. Procedures should then be established for joint acquisition and management of spare parts sets.

B1.1.3: Proposals for implementation – piloting bodies

The OFWG has identified six ways to implement the above proposals and recommendations; each is considered to be affordable and achievable within a five-year timeframe.

Recommendations towards funding agencies and National authorities.

A prerequisite for any exchange is that the funding authority (national and/or regional and/or scientific council) agrees to enter the process and delegates its authority to an operational structure which will coordinate and negotiate legal and related governance issues.

Similar approaches could be mandatory in cases such as:

- Allowing national fleet managers to charter vessels or equipment to European partners;
- Chartering partners' vessels or equipment for highly ranked cruise proposals in the case of technical failure or if the partner's own fleet is not available;
- Establishing a pan-European call for multinational cruises;
- Setting-up a common call for scientific proposals from new Member States as well as developing countries outside Europe.

These recommendations could be further considered within the auspices of MarinERA (FP6 ERA-NET) since the main European marine funding authorities are participating in the project.

Publication of available ship and equipment time.

Gathering information about spare shiptime has been difficult, while such data are essential to initiate exchanges (see below). Such information could be centralised in a dedicated website in liaison with the POGO[23] initiative which is developing a research cruise database. The POGO cruise database will be maintained by SeaDataNet[24] in which all European players are already involved. The OFWG proposes a continuous process based on progressive participation of volunteering countries or managers. However, the main challenge comes from the owners and operators of the Regional class vessels as they have to build up mutual confidence and trust to move towards co-acquisition of future vessels.

Reinforcement of the Ocean Facilities Exchange Group (OFEG[25]) organisation.

The OFEG bartering agreement has proved to be a highly successful system that is worth being applied also on a regional scale. For OFEG itself, it may be timely to enter a consolidation phase, to focus on Global and Ocean class European vessels and heavy rare equipment.

A few suggestions can be made in this regard:

- Extend the OFEG group;
- Increase the lead time for cruise and equipment scheduling;
- Harmonise and standardise logistical procedures;
- Support common use of embarked software;
- Standardise cruise preparation and evaluation documents;
- Establish joint procurement systems, e.g. for fuel or shipping agents;
- Define standard ship designs and joint tenders for the building of new vessels.

Since 2004, the US National Science Foundation has been participating in OFEG spring meetings as an observer. The OFWG suggests the extension of this participation by observers to other worldwide players in the field.

23 Partnership for Observation of Global Oceans (www.ocean-partners.org)

24 Pan-European infrastructure for Ocean & Marine Data Management (www.seadatanet.org)

25 Ocean Facilities Exchange Group (http://www.nerc.ac.uk/research/sites/facilities/marine/ofeg.asp)

B. Recommendations for an enhanced European ocean research fleet and its management

OFEG originates from an initiative of three ISOM[26] members: it has a unique dimension and aims at consolidating interaction in a complementary manner with other initiatives such as ERVO and ISOM.

To clear up any ambiguity, a higher level of information exchange, complementarily with the OFEG website (with links to every partner's websites, to pooled equipment related web pages and to ERVO and ISOM yearly status reports) might help. Additional outreach activities could include:
- Increased dialogue with officers of the European Commission;
- The dissemination of press releases (and other products) to Marine Board Member Organisations in order to publicise annual achievements and statistics, and/or results of exchanged cruises.

A European initiative for interoperability.

A recommendation is made to the **European Commission** to incorporate funding for European fleets/ship-time, equipment and related interoperability issues into the next Framework Programmes. The required budget would be low and the results would foster cost effective integration. A time target of four to five years would be reasonable.

Creation of new marine facilities bartering groups.

The OFWG strongly suggests that initiatives should be undertaken to build up regional and/or thematic exchange groups based on OFEG principles. This recommendation is addressed to the Marine Board Member Organisations and to EFARO to launch new bartering groups. These groups could be either regional (e.g. the BONUS group dealing with Baltic Sea fleets) or thematic (e.g. a joint group of owners with shallow water ROVs or of mobile winches). **Establishing two to three barter groups within three years would be an achievable objective.**.

Development of national equipment pools.

The OFWG strongly suggests that initiatives should be undertaken to set up (national) equipment pools as a tool to improve the opportunity for coordinating programming and sharing equipment. The development of **three to five new equipment pools** on a national or regional basis **within three years** would be achievable.

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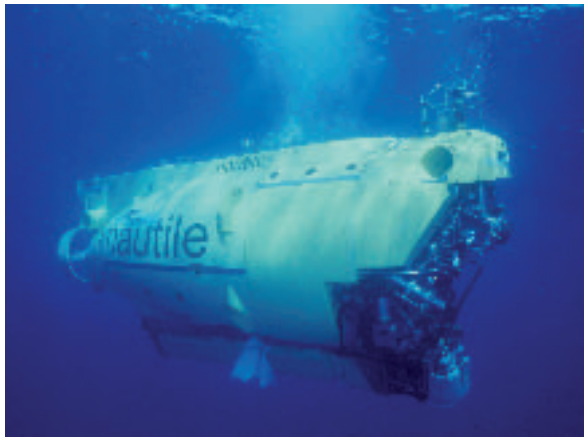
Multicorer for geochemical, sedimentological and micropaleontological sampling on board RV *Polarstern*



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The manned submersible Nautile

B1.2. How to widen access to European scientific fleets

Another way of using the existing fleets more efficiently is to enlarge the number of their potential users.

B1.2.1. Recommendations

Joint cruises.

Joint cruises are an excellent integrating instrument. They could cover the integration of two or more national cruise proposals to work on the same geographical site on a single large platform, each partner covering a percentage of the cost (in barter points or in cash). Joint cruises could give access to large, well-equipped vessels to scientists from countries where such infrastructures are not available. Nevertheless, two issues

26 International Research Ship Operators (www.isom-info.org)

have to be addressed to achieve that goal: the funding scheme of joint cruises and the time spent at sea for scientists (which would be longer than originally planned).

Rare systems.

The European fleet includes a number of unique rare vessels and/or types of equipment that are owned and run by only one country at the European level, a few on a world scale. Enhancing the use of these rare systems is very important, as it valorises European investment and widens the user community. There are many examples of joint use of equipment and instruments which are initially procured by a single institution and later are used by different users. All users share the operating costs which enable the maintenance of well-trained personnel and owners' investment to upgrade the system. As a first step, this could be initiated with one or two cruises per year.

New Member States access.

In order to facilitate access by scientists from new Member States to the European fleet, the OFWG suggests that they should be incorporated into national cruises (joint cruises) or to offer them to propose full cruise projects involving well-equipped European infrastructures.

The OFWG emphasises the need to allocate a budget within the European Union Framework Programme for the **pre-design study of a new Regional vessel**, aiming at covering the needs of the new Member States in the Eastern Mediterranean and the Black Seas (following the example of the Baltic Sea countries). New Member States such as Bulgaria, Cyprus, Malta, Romania and Slovenia, either do not have Research Vessels at all or they own some old or insufficiently equipped vessels. This new vessel would also be useful for Croatia, Turkey, Ukraine, Russia, Georgia and the surrounding countries of the Mediterranean Sea (North Africa and West Asia).

B1.2.2. Proposals for implementation – piloting bodies

Through MarinERA.

The objective of MarinERA (FP6 ERA-NET) is to enhance cooperation and coordination amongst European marine national research programmes. Joint cruises are typical examples of such a cooperation process, and are proposed to be further included in future MarinERA activities.

Through the European Union.

The European Union, through the offices of the European Commission, has a central role in supporting transnational access to infrastructures. The OFWG suggests establishing a special funding scheme to facilitate access to rare European infrastructures, covering the cost of such infrastructures for a limited number of days per year over two or three years.

Another funding scheme could be set up to facilitate access by new Member States to Research Vessels and equipment. The excellence of proposals would have to be assessed by an international peer review group that would rank the proposals and evaluate the post-cruise results as well.

Another suggestion to the European Commission is to directly fund a number of sea days on different academic Research Vessels and/or private ship operators. The assessment could be articulated around the following points:

- Who is interested in selling shiptime?
- In which geographical area?
- At what time of the year and for how long?
- What science programmes is the European Union Framework Programme willing to support?

This model will:

- Allow the European Union Framework Programme to fund science projects that include shiptime without owning any ships themselves,
- Enable research groups, through the institute or university to which they belong, to carry out research they would not be financially able to do if they had to hire a vessel on their own.

In addition, the European Union Framework Programme could allocate shiptime to science projects which they fund directly or to science projects which they find to be of particular interest or value (even if they are not directly funded by the European Union Framework Programme).

Such a model would give the European Union Framework Programme a significant influence and impact on the planning and priorities in the different Member States regarding management of the Research Vessel fleets; how the shiptime is used and what kind of marine science is included would have to be prioritised.

It would also enable vessel operators who have spare capacity to better utilise the vessels and get a better financial security for the procurement and operation of the vessels. Based on this, it would allow the European Union Framework Programme to vary their funding level annually with no need to set up their own, internal organisation to monitor and control the ship procurement/management/operation. To sum up, this model generates full competition for every cruise both for scientific teams (who want shiptime) and ship operators (who have shiptime to offer) and it implies no investment capital spending for the European Union. This is the pay as you go model.

Through the Marine Board.

The OFWG considers that information on vessel access is limited, and that no consolidated data are available.
Consequently, the group recommends that the Marine Board:

- Establish yearly statistics concerning European/international participation on national cruises;
- Compile data and highlight trends for short as well as long-term exchanges;
- Launch a **Marine Board yearly award** dedicated to European cruises. An international jury would have to be designated to define the awarding criteria. The first award could be granted in 2007.

B2. Approaches to long-term investment strategies

On the basis of figures presented in Section A, an attractive objective concerning the European fleet would have been to propose a global – and theoretical – renewal scheme for the next decade, with sub-objectives for each vessel class and for each type of scientific equipment.

Such an approach appears unrealistic in the near future as **the main funding authorities remain essentially National**. However, a lot of fruitful European partnerships could still be launched within the existing structures. Even for individual countries, the definition of general criteria and objectives (presence on certain geographical sites, deployment of equipment, and coherent insertion in national and European sets – therefore avoiding duplication) is probably preferable to fixed schemes which could really handicap any adaptative and integrated process and thus slow down partnership. Funding authorities generally no longer accept that obsolete ships or heavy equipment will be replaced on a one to one basis: the adaptation of the new investment to current scientific needs and the proper inclusion in European schemes often have to be proved to obtain the needed funding.

In order to prepare a road map concerning a new vessel or equipment, the promoting funding body should preferably present the project to potential co-funders with long lead time, at least three years in advance. They thus build a joint project adapted to the needs and requirements of all potential co-founders. As an incentive for such a worthwhile integrating process, European Union financial support would be decisive, even when limited to 10-15% of the total cost.

B2.1. Vessels

The situation described in section A1 is:

- Three countries run non-polar Global class vessels;
- Nine countries run Ocean class vessels, including four countries running Global class vessels;
- 16 countries run Regional class vessels, nine of them running only Regional class ships.

In total, 19 players could be interested in potential co-operation:

- 10 single ship operators
- Two twin ship operators
- Seven ship operators running three or more vessels, five of them working within the OFEG framework.

A challenge would be to favour adequate conditions for this community **to maintain close relationships and to achieve co-ownership in addition to actions recommended in Section B1**. Higher priority should be given to Regional class vessels. Section A shows that these vessels are generally old and dispersed among owners. Public interest is however relevant as the work performed on these vessels contributes to answer sensitive questions of societal relevance such as those on the environment, living resources and water quality. Moreover, cooperation between neighbouring countries is rarely optimal, because they frequently undergo seasonal pressure on shiptime.

B2.1.1. The ownership of vessels

The planning of the annual cruise for most Research Vessels is primarily based on scientific priorities (if the vessel is owned and used by one user group). If the vessel is jointly owned by different user groups, the shiptime will normally be divided among them, based on each user group's share of the ownership and/or on how much each user group contributes to the annual operating cost of the ship. This model is already used on a national and bilateral level in Europe and is easy to implement.

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RV *Discovery*, an Ocean Research Vessel at Southampton docks

No international organisation can own a vessel: a vessel has to be owned by an organisation within a specific country. Therefore, any bilateral or multilateral ownership is controlled and managed by a single national company (or institute) that acts as the vessel's owner. Any agency and/or institute from different European countries can agree on the procurement or building of a Research Vessel: it would then be jointly owned by the different parties (but formally owned by only one of the parties) or a company owned jointly by the parties, and registered in a flag state of choice. One example of such international co-ownership is the French/Spanish RV *Thalassa* (section 4.2.2). Different European institutions in different countries will own and operate Research Vessels together if they find it to be of economic and/or scientific benefit to all. Such partnerships exist today on both national and international level.

B2.2. Equipment and instruments

There are some examples of joint ventures on procuring and operating expensive and sophisticated equipment and instruments (ROVs, AUVs, manned submersibles, seismic equipment etc.). In most cases such joint use is driven by the fact that none of the partners has the means and/or the need for continuous operation of the equipment/instrument of its own organisation.

B2.2.1. The ownership of equipment and instruments

Equipment and instruments are easier to own than are vessels because they do not fly any national flags and usually do not have to be registered in a particular country. This however may not be the case for AUVs and manned submersibles, so that they may have to be considered more like vessels in the near future. But for equipment and instruments that are expensive to procure, costly to operate and maintain, and which are not very often used, there is a **potential for cost sharing between different co-owners and/or users**. There are few – if any – examples of co-ownership of equipment between institutions from different countries, but there are examples of it within countries.

B2.2.2. Rare equipment

When considering marine science infrastructures and rare equipment in particular, there is a need to fund the design, procurement and operation of different types of equipment (deep water ROVs and manned submersibles) on a multinational level. No single country is able or willing to own and operate rare equipment by itself.

Different countries could then enter a competition to be the main operator while all countries involved contribute financially to the operation and maintenance costs of the shared unit via a common pot. Within this scheme, the European Union could also be a partner or financial contributor to both the procurement and the operation of such equipment. Access to rare equipment would be shared accordingly.

B2.3. Implementation

Five recommendations have been developed:

Through funding agencies and National authorities.

All European countries involved in marine research should be encouraged:

- To seek cooperation and joint ownership of sophisticated instruments and equipment that are seldom used by any individual institute and/or country and are expensive to procure, operate and maintain;
- To maximise the design, procurement and operation of such sophisticated equipment and instruments.

Through the European Union.

The OFWG hopes that the European Union will incorporate research fleets management in its priorities, and thus support enhanced cooperation to build new joint Research Vessels or equipment. Inclusion of Research Vessels in the ESFRI road map is important as it could give access to Article 169 funding (15% input)[27]. The European Union Framework Programme could also allocate funds for buying user time for such tools and let

27 Article 169: http://cordis.europa.eu/fp7/art169_en.html

B. Recommendations for an enhanced European ocean research fleet and its management

Global RV *JC Ross* and ROV Isis

Victor 6000 on RV *Pourquoi pas?* (MOMARETO mission in 2006)

European Union Framework Programme -sponsored projects and/or new Member States-sponsored scientists and/or science programmes make use of that equipment or instrument time. In addition to the general financial support, adequate instruments could be made available for European Union Framework Programme funded projects and could be provided to new Member States for use in their research programs, by their scientists. Countries or institutions who want to invest in such equipment and instruments can invest in the design and procurement phases based on the possibility to sell user time to European Union or other institutions/countries.

Through the ERVO group.

The OFWG proposes that ERVO acts as a forum, as well as performing its good practice exchange tasks, especially for Regional class vessels. During the annual ERVO meeting, every member could present its investment plan and initiate informal contacts with potential partners. The same process could be undertaken for light equipment and instruments.

Through the OFEG.

In addition to Section B1 recommendations, the OFEG is invited to act as the forum for Ocean and Global class vessels and for heavy equipment.

Through the EurOcean website.

Non-confidential information could be inserted on the EurOcean website to allow continuous consultation and global follow-up for statistical purposes.

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RV *Pourquoi pas?*, a Global Research Vessel

© UTM-CSIC

Global RV *Hesperides* crossing the Gerlache strait in Antarctica

Conclusions

This report provides a unique opportunity to present to European and international decision makers an up-to-date status of European research fleets, and proposes new steps forward as required by the ambitious mandate that the OFWG received in 2004.

It has been difficult to gather the data concerning European fleets to complete the fleet survey. Some of the information is still missing but the main actors gave significant inputs to this report and the resulting tables and figures are clear.

As a whole, European fleets are confirmed as a magnificent scientific tool, comparable to the US one.

The scientific equipment component has been surveyed for the first time; **the European equipment set is very diverse and foremost in the world**.

Overcapacity is not a reality, and renewal remains necessary. **The old Regional fleet** – representing 20 ships in a total of 46 – **is in a highly dangerous condition.**

The OFWG also studied the numerous successful cooperation schemes; **scientific fleets appear as an important partnership application within Europe**.

For section B of the report, the OFWG decided to raise pragmatic recommendations: eight, concerning ships and equipment and how to use the existing fleet more efficiently; three to widen scientific access to it; and finally, five concerning long-term strategy.

This tool box opens a wide range of independent possibilities for cooperation. It is not a theoretical global European plan which will never be used.

First of all, as the main funding providers for scientific fleets, a lot of initiatives involving short-term decisions are proposed to National authorities. European governing bodies are requested to support some innovative projects to foster cooperation. The Marine Board Member Organisations could drive some other initiatives, such as the launching of new pools of vessels and equipment.

It is proposed that a lot of other European actors, such as OFEG, ERVO or EurOcean facilitate the development of partnerships within Europe as with the USA and the rest of the world.

The majority of all these key players participate in the MarinERA project (FP6 ERA-NET project). The OFWG hopes that some of the recommendations could be further considered within the frame of MarinERA, and lead to rapid success.

European Ocean Research Fleets
Towards a Common Strategy and Enhanced Use
Summary of issues with their related recommendations

Enhanced means of using the European fleet more efficiently	
Recommendations concerning vessels	– Enhance coordination of fleet scheduling; – Promote bartering to avoid long passage time between cruises; – Encourage chartering process to use the non-funded time; – Create a 'scrap premium' to get rid of old and under-utilised vessels;
Recommendations concerning equipment	– Enhance coordination of equipment scheduling; – Achieve interoperability of equipment; – Transnational deployment teams; – Sharing of spare parts;
Proposals for implementation	– Towards funding agencies and National authorities; – Available ship and equipment time to be published; – Reinforcement of the OFEG organisation; – A European initiative for interoperability; – Creation of new marine facilities bartering groups; – Development of national equipment pools;

How to widen access to European scientific fleets	
Recommendations	– Joint cruises; – Rare systems; – New Member States access;
Proposals for implementation	– Through MarinERA; – Through the European Union; – Through the Marine Board;

Long-term investment strategies	
Recommendations	– Develop a flexible and adapted framework to better integrate strategies and favour the development of partnerships; – Facilitate co-ownership of RVs, favour adequate conditions to maximise relationship between managers and owners and on a bilateral/multilateral basis; – International cooperation in cost-sharing for the construction and operation of rare equipment; – Facilitate equipment availability for European Union Framework programme funded projects; – Facilitate the access to equipment to scientists from new Member States;
Proposals for implementation	– Through funding agencies and National authorities; – Through the European Union; – Through the ERVO group; – Through the OFEG; – Through the EurOcean website;

Appendix 1 – European multipurpose Research Vessels accessible for academic (basic) research outside coastal regions

Country	Ship	Class		Academic research			Major capabilities								Major facilities		
		G O R	length (meter)	since	used (d/y)	spare (d/y)	Region	Oceano-graphy (m)	Geology Geo-physics (m)	Fish	Dynamic Position	Core. (m)	ROVs AUVs Subs	Others	L-Cont (Nb)	Fiber optic cable (m)	Multibeam Echo-sounder (m)
Belgium	***Belgica***	R	51	1984	200	No (N)	North Sea	1600	1000	Demersal (D)	N	N	N				
Bulgaria	***Akademik***	R	56	1979	80	30	Black Sea	Yes (Y)	Y	N	N	5	PC8B, 250m		N	N	N
Croatia																	
Danemark																	
Estonia																	
Finland	***Aranda***	R	60	1989	150	20	Baltic/ Arctic	4000	Y				400 m	Ice breaking	2		
France	***Marion Dufresne***	G	121	1995	220	N	Global	6000	6000	N	Y	60	N		>20	N	>6000
	Pourquoi pas?	G	105	2005	180	N	Global	6000	6000	N	Y	30	Victor	2 U.Vehi-cules	>13	8000	6000
	L'Atalante	G	85	1990	300	30	Global	6000	6000	N	Y	20	Victor	Heavy seismics	9	N	6000
	Le Suroit	O	56	1975 Refit 1999	300	30	Ocean	4500	4500	N	N	N	N		3	N	4500
France & Spain	***Thalassa***	O	74	1996	270	N	North Atlantic (NA)	6000	N	Y	Y	N	Victor	Deep trawl	5	N	N

Class: Global (G), Ocean (O), and Regional (R);
Academic research: only ships younger than 35 years, except when they underwent a major refit;
Used time – day per year (d/y): estimates of funded and spare shiptime.
m: meter
L-cont (Nb): Laboratory container (number)

Appendix 1 – European multipurpose Research Vessels accessible for academic (basic) research outside coastal regions

Country	Ship	Class		Academic research			Major capabilities								Major facilities		
		GOR	length (m)	since	used (d/y)	spare (d/y)	Region	Oceano-graphy (m)	Geology Geophys. (m)	Fish	Dyn. Pos.	Core. (m)	ROVs AUVs Subs	Others	L-Cont (Nb)	Fiber optic cable (m)	Multibeam Echo-Sounder (m)
Germany	*Polarstern*	G	118	1982	200	0	Polar	6000	6000	Pelagic (P)	Y	24	Victor	Icebreaking			>6000
	Meteor	G	98	1986	330	0	Ocean	6000	6000	P	Y	24	Quest			7000	>6000
	M.S. Merian	G	95	2006	330	0	Ocean	6000	6000	N	Y	24	Quest	Ice edge		7000	>6000
	Poseidon	O	61	1976	300	30	NA	6000	4000	P	N	12	Cherokee	Jago	1		3000
	Alkor	R	55	1990	200	30	Baltic	3000	1000	P	N	N	Cherokee	Jago	2		N
	Heincke	R	55	1990 Refit plan	200	30	North Sea	3000	1000	P	N	N	Cherokee	Jago	2		N
Germany, 7-y charter	*Sonne (until 2010)*	G	98	1969	250	90	Ocean	6000	6000		Y	24	Quest	Heavy seismics		7000	>6000
Greece	*Aegaeo*	R	62	1985	270	0	Mediter-ranean Sea (M)	5000	1000	N	N	6	Yes	Sub-marine	3	2000	6000
Iceland	*A. Fridriksson*	O	70	2000	?	charter	NA	2500	N	Y	N	N			N	N	N
	Saemunds-son (until 2006 ?)	R	56	1970	?	charter	Iceland		N	Y	N	N			N	N	N
Ireland	*Celtic Explorer*	O	65	2003	200	25-75	NA	Y	Y	Y	Y	Y	ROV		4	N	Y
	Celtic Voyager	R	31	1997	100	50-75	Irish Sea	Y	Y	Y	N	Y	N		1	N	Y
Italy	*Explora (until 2009)*	G	73	1973 refit 2004	200	30	Antarctica	6000	6000	P	N	Y	N	Antarctic Supply		N	Y
	Urania	R	61	1992	?		M										
	Universi-tatis	R	45	2003	125	50	M	5000	5000	D, P	N	6	Light ROV		1	N	2500
Latvia																	

Country	Ship	Class		Academic research			Major capabilities								Major facilities		
		G O R	length (m)	since	used (d/y)	spare (d/y)	Region	Ocea-nography (m)	Geology Geophys. (m)	Fish	Dyn. Pos.	Core. (m)	ROVs AUVs Subs	Others	L-Cont (N)	Fiber optic cable (m)	Multibeam Echo-sounder (m)
Lithuania	*Vejas*	R	56	1980	??		Baltic		Y								
Monaco	*N/a*																
Netherlands	*Pelagia*	O	66	1991	270	30	Ocean	6000	6000	N	N	20	Quest	DTS/TOBI	9	In 2007	In 2006
Norway	*G.O. Sars*	O	77	2003	75	0	NA	6000	6000	D, P	Y	23	ROV			6000	5000
	J . Mayen	O	64	1992	100	0	NA	4000		D, P	N	15					5000
	J. Hjort	O	64	1990	25	0	NA	4500		D, P	N						
	F. Nansen	O	57	1993	0	0	South Atlantic	3500		D, P	N						
	H. Mosby	R	47	1980	100	0	NA	4000		D, P	Y		ROV				
Poland	*Oceania*	O/R	48	1985	280	0	NA	4000	N	N	N	N	N	Sailing ship	no	no	planned
Portugal	*Don Carlos I*	R	68	1989 (refit 2002)	30	45	NA	6000	Y	N	N	N	small ROV		1	no	>6000
	Capricornio (until 2006?)	R	47	1969													
	Noruega (until 2007?)	R	47	1971													
Romania	*Mare Nigrum (until 2010-12)*	R	82	1971/ 2004	60	100	Black Sea (Bk)	2000	2x 2000	Y	N	4	N		3	N	3000
Slovenia																	

III

Appendix 1 – European multipurpose Research Vessels accessible for academic (basic) research outside coastal regions

Country	Ship	Class		Academic research			Major capabilities								Major facilities		
		GOR	length (m)	since	used (d/y)	spare (d/y)	Region	Oceano-graphy (m)	Geology Geophys. (m)	Fish	Dyn. Pos.	Core. (m)	ROVs AUVs Subs	Others	L-Cont (N)	Fiber optic cable (m)	Multibeam Echo-sounder (m)
Spain	*Hesperides*	G	83	1991/ 2004	300	0	G	6000	6000	N	N	10		TOBI/ Polar supply	3		>6000
	Cornide de Saavedra	O	67	1980/ 1987	300	0	Atlantic (A), M	4000	4000	D, P	N				2		N
	Visconze de Eza	O	53	2001	325	0	A, M	4500	5000	D, P	Y		Swordfish (600m)		?	2000	5000
	Garcia del Cid	R	37	1979	150	100	M	6000	6000	D, P	N	4			N	N	N
	Sarmiento de Gamboa	O	70,50	2007	315	15	A, M, etc.	8,000 11 mm	8,000 16 mm	2 X 5500 m 22mm	Class 1	7000 m (10-15m)	Victor 6000	MCS-seismic (6.0 km streamer)	5	N	11,000
Sweden	*Argos (until 2009?)*	R	61	1974/ 1993	200	20	Baltic	1500	7000	Y	N	N	ROV (300 m)				
Turkey	*Bilim*	R	42	1983			M, Bk	2000	Y	P					N	N	N
UK	*J.C Ross*	G	99	1991	60	0	Polar	6000	6000	N	Y	30	ISIS / Autosub	Icebrea-king	4-5	10000	6000
	Discovery	G	90	1992	250+	0	Ocean	6000	6000	N	N	30	Autosub		2-3	10000	N
	C. Darwin	O	69	1984	250+	0	Ocean	6000	6000	N	N	12	Autosub		2-3	10000	6000
	P. Madog	R	35	2001	60	100+	Irish Sea	1000	N	N	N	N	Phantom		1x10 ft	N	N

Appendix 2 – Large exchangeable instruments and their foreseeable evolution

Country	Geology and geophysics							Submersibles					Laboratory containers	
	2D seismics	*3D seismics*	*Giant piston corer >25 m*	*Piston corer <25 m*	*Gravity corer*	*Ocean Bottom Seismo-meter*	*Video Grabs*	*Manned subs*	*ROV <1000m*	*ROV <5000m*	*ROV >5000m*	*AUV*	*General*	*Dedicated*
Belgium	X	X												
Bulgaria	X	0	0	X	X	U	0	X	0	0	0	0	0	0
Croatia														
Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denmark	0	0	0	X	X	U	U	0	0	0	0	0	X	X
Estonia														
Finland	0	0	0	0	X	0	0	0	X	0	0	0	0	0
France	X	X	0	0	X	*	0	0	0	0	X	X	0	X
Germany	X	X	0	X	X	X	X	X	X	X	0	X	X	X
Greece	X	0	0	0	X	X	0	X	X	X	0	0	X	X
Iceland														
Ireland	0	0	0	0	0	0	X	0	0	0	0	0	X	
Italy														
Latvia	0	0	0	0	X	0	0	0	0	0	0	0	0	0
Lithuania														
Malta														
Netherlands	X	0	0	X	X	0	0	0	0	X	0	0	X	X
Norway	X	0	X	0	X	X	U	0	X	X	0	X	X	U
Poland	X	X	0	0	0	0	X	0	X	0	0	0	X	0
Portugal														
Romania	0	0	0	0	X		0	U	U	U	U	U	U	X
Slovenia														
Spain	X			X	X	X			X				X	X
Sweden	U	U	U	U	X	U	U	U	X	U	U	U	X	U
Turkey	x			x	x				x					
UK	X	0	X	X	X	X	0	0	X	X	X	X	X	X

* = laboratory scientific equipment
X = Possesses the relevant capability
0 = Does not possess the relevant capability
U = Unknown to the respondent

Appendix 2 – Large exchangeable instruments and their foreseeable evolution

Country	Towed vehicles					Other	Seabed survey			Seabed observatories		Portable winches		
	Side scan sonar	Echo sounders	Plankton counter	Video camera	Ondulating Systems	Moving Vessel Profiler MVP	Multi beam sonar < 1000m	Multi beam sonar > 1000m	Sub bottom profiler	Landers <3 tons	Heavy Obser-vatories	Wire	Co-axial	Fibre Optic
Belgium	X			X			X					X		X
Bulgaria	X	0	0	0	0	0	0	0	X	0	0	0	0	0
Croatia														
Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denmark	X	X	X	X	X	U	X	U	U	U	U	0	U	X
Estonia														
Finland	0	0	0	0	X	0	0	0	0	0	0	0	0	0
France	X	0	0	0	0	U	0	0	X	0	0	X	X	X
Germany	X	X	X	X	X	0	X	X	0	X	X	X	X	X
Greece	X	0	0	0	0	0	X	X	X	0	0	X	X	0
Iceland														
Ireland	X	X	X	X	X	X	X	0	X	0	0	X	X	0
Italy														
Latvia	0	X	0	0	0	0	0	0	0	0	0	X	0	0
Lithuania														
Malta														
Netherlands	0	0	0	X	0	0	0		X	X	0	X	X	X
Norway	U	X	X	X	X	U	0	0	0	U	U	X	X	X
Poland	X	X	X	X	X	U	X	0	X	0	0	X	X	X
Portugal														
Romania	X	X	0	X	X	U	U	X	X	0	0	U	U	U
Slovenia														
Spain		X	X	X	X		X	X	X			X	X	
Sweden	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Turkey	x	x		x		x		X	X	X		X		
UK	X	X	X	X	X	X	U	X	X	0	0	X	X	X

* = laboratory scientific equipment
X = Possesses the relevant capability
0 = Does not possess the relevant capability
U = Unknown to the respondent

Appendix 3 – Existing partnerships

Type	Name	Partners	Purpose	Since	Ships/equipment involved	Reference
Barter systems	Ocean Facilities Exchange Group, OFEG	IFREMER/F NERC/UK BMBF/D NIOZ/NL UTM-CSIC/ SP IMR/NO	Barter system for Ocean Research Vessels/large equipment	1996	2 polar ships 8 Global class (G) ships 12 Ocean class (O) ships 4 Regional class (R) ships 4 deep sea ROVs, other large equipment, special containers, technical support	http://ofeg.nerc.ac.uk
		NERC/UK & NSF/US	Barter system for Ocean Research Vessels/large equipment	Ca 1985	3 UK ships 27 UNOLS ships	www.nerc.ac.uk/funding/marineplan/tripartitebarterarr.shtml
		NERC/UK & IMR/N	Barter system for Ocean Research Vessels	2005	3 ships from the UK 4 ships from Norway	http://www.nerc.ac.uk/funding/marineplan/tripartitebarterarr.shtml
Shared investements, running costs		France Spain	Shared shiptime	1996	RV *Thalassa*	www.ifremer.fr/fleet/navires/index.html
	NATO	Some NATO members	Research for military and public institutions of NATO members	1988	RV *Alliance*	www.saclantc.nato.int/centre/index.html
Charter contracts		RF/D (ship's owner) BMBF/D (charterer)	Long term use of multipurpose research ship	7 years 2004-2010	RV *Sonne*	www.rf-gmbh.de
Joint Projects, Programmes	ERVO	48 members from 18 countries and 2 international organisations	Meeting of European Research Vessel managers	1999	none	http://www.esf.org/esf_genericpage.php?language=0&section=2&genericpage=625&domain=3&activity=0
	EurOcean	Belgium, France, Ireland, Norway, Poland, Portugal	Internet portal for marine sciences	2000	Oceanic data base	http://euroceanrv.addition.pt/index.jsp
	BONUS	Baltic Sea funding agencies	Initiative for future marine research in the Baltic Sea	2003	none	www.bonusportal.org
	Bilateral Agreement	AWI/D IFREMER/F	Bilateral agreement for joint use of VICTOR and POLARSTERN	2002	RV *Polarstern* RV *Pourquoi pas?* RV *L'Atalante* RV *Thalassa* ROV *Victor*	www.polarstern-victor.de
	MoU	IMR-Bergen, Norway MI-Galway, Ireland	Broad agreement on cooperation in marine science & training; collaboration on shiptime, best practice for RV *operation*	2005	Calibration facilities Research Vessels	www.marine.ie www.imr.no
	MarinERA	IFREMER/F Marine Board-ESF 13 National funding agency partners	IFREMER/F Marine Board-ESF 13 National funding agency partners	2004 – 2008	none	www.marinera.net

The table lists long-term partnerships only, both existing and anticipated.
Single case charter and single case bilateral agreements are excluded.

Appendix 4 – Description of present management processes

Questionnaire
(established by Marieke Rietveld, NIOZ)
Budget granting – shiptime allocation and managing organisation, with their milestones.
Please answer the list of questions, and add a short explanation.

Please list the name(s) of the research ship(s).

1. Who is the owner of the research ship(s)?
If owner differs per ship, please specify.

2. Which is the managing organisation of the research ship(s)?
If there is more than one managing organisation, please differentiate.

3. Where must the science project application/ proposal with shiptime requirement be submitted?
Name the organisation(s) (research council, institution, committee etc.), and contact person(s).
If the organisation differs per ship, please specify.

4. What is the date/deadline of submission for a cruise in year X?
If dates/deadlines differ per organisation and/or ship, please differentiate.

5. How is the application/proposal refereed – ranking procedure?
If the procedure differs per organisation and/or ship, please differentiate.

6. Which organisation grants/allocates the requested shiptime?
a. Same as for question 3.
b. If other, name the organisation(s) (research council, institution, committee etc.), and contact person(s).
If the organisation differs per ship, please specify.

7. At what date/what deadline the grant/allocation is decided and communicated to the proposing scientist and managing organisation?
If dates/deadlines differ per organisation and/or ship, please differentiate.

8. How is the requested shiptime granted/allocated?
a. Is shiptime granted in number of ship days plus the money to cover the daily rate of the ship to be used?
b. Is shiptime granted as a right to use a number of ship days (where the costs per ship day are covered via another route)?
If the procedure differs per organisation and/or ship, please specify.

9. How is the managing organisation funded to cover the running costs (including maintenance) of the Research Vessel(s)?
If there is more than one funding source, please differentiate.

10. How is marine technical support organised for preparation of the research cruise and on board the ship?
a. Managing organisation
b. Separate support organisation
c. Other, please specify

11. How is the marine technical support of question 10 funded?

12. When shiptime is granted/allocated, which organisation is responsible for the cruise planning/ scheduling?
Please name the organisation(s), and contact person(s). Also specify, if a separate authority has to approve the schedule.

13. Is there any national/international shiptime exchange/bartering in the planning procedure?
If yes, please, specify.

14. What is the date/deadline the cruise schedule is expected to be ready and 'definite'?
If dates differ depending on ship/organisation, please specify.

15. Is there: a post-cruise assessment, cruise report, technical report, or other reporting?
Please specify, and name receiving organisation with contact person, and deadline.

16. What would be the funding organisation for replacement/new build of Research Vessel(s)?
If there is more than one funding organisations, please differentiate.

Please give your suggestions to improve the management processes in the future.

Equipment Pool
17. Is there an equipment pool of seagoing equipment in your country?
If yes:
a. Which is the managing organisation of the equipment pool?
b. How is this equipment pool funded?
c. Is there a long-term plan for this equipment pool?
d. How is new equipment/replacement investment decided upon?
e. How is application and allocation to a cruise decided upon?
If no:
a. How is the various seagoing equipment managed?
b. How is the equipment funded?
c. How is new equipment/replacement investment decided upon?
d. How is application and allocation to a cruise decided upon?

Shiptime for eu Programmes
Name of ship: Ship days paid by national funding for EU programmes
Ship days paid by EU funding (for conversion into barter points) 1998 1999 2000 2001 2002 2003

Appendix 5a – Influence of European Union Framework Programme funded research projects on shiptime usage

(ESF EUROCORES projects are not taken into account)

Name of the ship	Ship days paid by national funding for EU programmes						Ship days paid by EU funding					
	1998	1999	2000	2001	2002	2003	1998	1999	2000	2001	2002	2003
ARANDA	132	121	140	123	147	119	38					
L'ATALANTE				30								
THALASSA	36						average 95 for fisheries research					
Le SUROIT					46							
NADIR				31								
AEGAEO	160	177	193	117	95	139	62	58	48	98	82	33
CELTIC VOYAGER (estimate)	200	200	150	150	180	180	25	25	50	50	40	40
CELTIC EXPLORER (since 2003)						180						20
PELAGIA	118	90	52	41	101	82			2.3	3	10	6
OCEANIA (estimate)	75	75	75	75	75	75						
HESPERIDES	18	20		24	16							
GARCIA del CID			19	6				40		44	16	18
CHARLES DARWIN	30		30			30	10					12
DISCOVERY	63		30	45	45		42		30	20	20	36
TOTAL	***832***	***683***	***689***	***642***	***705***	***805***	***177***	***123***	***130.3***	***215***	***168***	***165***

NB: No information on German and Norwegian Research Vessels

Appendix 5b – Deadline submission of proposal cruise in year X

1 month – 6 months before year X							
before 1st of month	*June*	*July*	*August*	*Sept*	*Oct*	*Nov*	*Dec*
Finland				**X**			
Greece							**X**
Ireland (*)					**X**		
Norway					**X**		
Poland	**X**						
Spain (Regional)	**X**						

* Tendency to practice longer lead times.

9 months – 24 months before year X					
No. of months	*24*	*16*	*12*	*10*	*9*
France	**X**		**X**		
Germany	**X**		**X**		
Netherlands		**X**		**X**	
Spain (Ocean)			**X**		
UK (*)					**X**

* Tendency to practice longer lead times. For the UK this applies to larger ships.

over 2 years (3 – 5) before year X	
Germany	*Polarstern*

Appendix 5c – Reviewing/Ranking system of cruise proposals
Appendix 5d – Allocation system

Country	Local committee	National committee	International peer review
Finland	**X**		
France			**X**
Germany	**(X)**	**X**	**X**
Greece	**X**		
Ireland	**X**		
Netherlands	**(X)**		**X**
Norway	**X**		
Poland	**X**		
Spain		**X**	
UK			**X**

X system in place
(X) system in place for a few cases

Countries	Running costs covered	Running costs not/partly covered	
	Allocation by right of time	Allocation by payment per ship day	Rest covered by
Finland		**X**	FIMR
France	**X**		
Germany	**X**		
Greece		**X**	HCMR
Ireland		**X**	MIE
Netherlands		**X**	NIOZ
Norway	**X**		
Poland		**X**	Ministry of Science
Spain	**X** (BIO *Hesperides*)	**X**	CSIC/IOE
UK	**X**		

Appendix 5e – Date of allocation/grant of shiptime for cruise year X

Appendix 5f – Support before and during cruises

Countries	Months before year X													
	24	12	11	10	9	8	7	6	5	4	3	2	1	0
Finland														
France														
Germany														
Greece														
Ireland														
Netherlands														
Norway														
Poland														
Spain														
UK														

Countries	By special technical team	By science team
Finland	X	
France	X	
Germany		X
Greece		X
Ireland	X	
Netherlands	X	
Norway	X	
Poland	X	
Spain	X	
UK	X	

Appendix 5g – Post-cruise assessment (PCA)
Appendix 5h – Funding replacement and new construction of Research Vessels

Countries	Cruise report		PCA Form		Debriefing meeting
	Grant	*Dipclear*	*4-eye*	*Internal*	
Finland	**X**				
France	**X**				**If needed**
Germany	**X**	**X**	**X**		
Greece			**X**		
Ireland	**X**				
Netherlands	**X**	**X**	**X**		
Norway	**X**	**X**			
Spain	**X**	**X**	**X**		
UK	**X**	**X**	**X**		

Countries	National authorities
Finland	*Government through respective ministry*
France	*Ministry of Research*
Germany	*BMBF plus Regional governments (Laender)*
Greece	*General Secretary of Research & Technology*
Ireland	*Department of Communications, Marine & Natural Resources*
Netherlands	*Ministry of Education, Culture and Science plus Research Council (NWO)*
Norway	*Norwegian Parliament*
Poland	*Ministry of Science*
Spain	*Ministry of Science & Education*
UK	*UK office of S&T of DTI Ministry plus Research Council NERC*

Appendix 5i – Equipment pool and long-term plan

Countries	Equipment pool	Long-Term Plan (LTP)	Comments
Finland	*No*	*No*	
France	*Yes*	*Yes*	*Not all equipment is pooled*
Germany	*N*	*N*	
Greece	*Y&N*	*N*	*Only HCMR has seagoing capabilities*
Ireland	*Y*	*Y*	*LTP first developed in 2004*
Netherlands	*Y*	*Y*	
Norway	*N*	*N*	*Working on establishing equipment pool and LTP*
Spain	*Y*	*N*	
UK	*Y*	*Y*	

Appendix 6 – Contribution from EFARO regarding European Fisheries Research Vessels

The present Marine Board report covers the oceanographic RV fleet. Another sector of the seagoing research fleet is related to fisheries research. Both worlds are traditionally segmented; however, few multipurpose vessels are active in both (fundamental) oceanographic and (applied) fisheries research. However, in the future, fisheries research will become more linked with the oceanographic research. The scientific support to fisheries policies requires an ecosystem based approach in the near future. Therefore, the Marine Board invited EFARO to present its views on the fisheries RV fleet, as an appendix to this OFWG report.

EFARO organised in January 2004 in Tunis a workshop on the European Fisheries RV fleet. At this workshop, it was stated that 94 RVs are active in the European fisheries research.

It was estimated that 50% of the cost of fisheries research is related to the exploitation of the RV fleet. There is scattered un-utilised RV time available (due to lack of funding or inappropriate planning); some countries require more RV time than they have access to. Shared use of RVs is not a common practice; only few countries (e.g. France and Spain) have bilateral agreements. However, most of the fisheries research surveys are internationally coordinated. There is also a common practice of sharing surveying equipment.

However, commitments to monitor remote regions result in non productive steaming time. Fleet managers see the possibility to more efficiently manage their medium size vessels in setting up a regional coordination organisation (Baltic Sea, North Sea/Atlantics, Mediterranean Sea West and Mediterranean Sea East). The largest vessels could best be used at European level.

The fisheries RV fleet is relatively old. Two third (62 RVs) are more than 20 years old, 25 RVs are even more than 30 years old. Half of the RV fleet is larger than 30 meters (48 RVs). The younger segment (<20 years: 30 RVs) is relatively larger than the older segment: 16 young RVs are > 50 meters.

The renewal of the fleet is stagnating. Fleet managers indicate a need for building approximately 25 new vessels within the next five years. The best utilisation of public funds would be to explore the co-utilisation of modern, multi-purpose vessels specialised in certain sea conditions. Exchanges of experiences and views on designing and building are welcome.

Therefore, the European Commission is requested to support an organisation to foster cooperation in European RV fleet management. EFARO is willing to participate in this process, although most of the institutes do not own their RVs. In the near future, it is recommended to explore the possibility to use fisheries RVs for oceanographic surveys and vice versa. This can be taken up in the cooperation between EFARO and Marine Board.

Several EFARO workshops were set up to assess the status of the fleet:

The Baltic Sea (Copenhagen workshop, November 2005)

In European countries, ship commitments and requirements in internationally coordinated survey activity are about 800-900 days at sea of mid to larger size fisheries Research Vessels (> 35 m). There is enough ship time available in the Baltic region to satisfy the needs for fisheries research.
Five vessels are used for standard fisheries research in the Baltic:

- RV *Argos* (61m, commissioned in 1974), too cost intensive, need replacement
- RV *Baltic* (41 m, 1993),
- RV *Dana* (78m, 1981), too cost intensive, need replacement within a 5-10 year time frame
- RV *Solea* (43m, 2003),
- RV *Walther Herwig III* (64m, 1993).

From these, RV *Dana* and RV *Walter Herwig III* operate mostly, and RV *Solea* partly, outside the Baltic. Additionally, RV *Argos* covers environmental monitoring tasks.
Neither the demand calculation nor the available ship time includes university operated ships, which are normally able to conduct fisheries research: RV *Skagerrak* (Gøtheborg) and RV *Alkor* (Kiel, 55m, 1990).
The necessity to improve the ship infrastructure for Baltic research has been recognised and resulted in the suggestion to build a new multipurpose Research Vessel for the Baltic (ESFRI list of opportunities 2005). Based on the preliminary analysis conducted during the meeting, it was agreed to explore the possibilities to extend the ESFRI suggestion presently focussing on the needs of the Baltic States to the entire marine and fisheries research community in the Baltic.

Appendix 6 – Contribution from EFARO regarding European Fisheries Research Vessels

The North Sea and the Irish Sea (Brussels workshop, April 2004)

Vessels used for standard fisheries research in North Sea and Irish Sea:

- RV *Belgica* (Belgium, 51 m)
- RV *Dana* (Denmark, 78.4 m)
- RV *Thalassa* (France, 73.7 m)
- RV *Alkor* (Germany, 55.2 m)
- RV *Heincke* (Germany, 54.5 m)
- RV *Solea* (Germany 42.7 m)
- RV *W.Herwig III* (Germany, 64.5 m)
- RV *Celtic Explorer* (Ireland, 65.5 m)
- RV *Celtic Voyager* (Ireland, 31 m)
- RV *Tridens* (Holland, 74 m)
- RV *Isis* (Holland, 26 m)
- RV *G.O.Sars* (Norway, 70 m)
- RV *Endeavour* (UK, 73 m)
- RV *Corystes* (UK, 53 m)
- RV *Lough Foyle* (UK, 43 m)
- RV *Scotia* (UK, 68 m)

The group recommended that a strategic planning group should be set up to establish the basis for collaboration and identify the tasks needed to implement the strategy, i.e.:

- to identify those countries willing to embark on collaborative arrangements and the specific ship resources that might be shared in some way;
- to define the nature of such collaboration;

This is to be considered, inter alia: ships programmes might be better integrated in order to add value to the science and use assets more efficiently.

These recommendations would require the establishment of a mechanism for international forward planning of programmes, and development of key information about the capability and scientific features of the vessels:

- How access to resources of different institutes would be paid for? This might involve payment in kind or agreeing on a standard basis for pricing and charging.
- How would the planning for the replacement or decommission of old vessels be co-ordinated on a regional scale?
- How will scientific standards and procedures be harmonised among the participants?
- The scope for marketing un-used capacity.

It is therefore recommended that an experimental workshop should be held to explore how joint ships' programmes might be planned.

Common issues :

- The North Sea international surveys take up 50 – 70 % of the yearly RV cruises capacity for > 35 m vessels.
- The need for nearshore and coastal research is increasing (due to focus on breeding grounds, windparks, habitat mapping), consequently there is an increased need for shallow water vessels.
- The cruise planning and vessel management arrangements differ from country to country and the manning of RVs also varies: they are either operated by the ministry or by private companies.
- Depending on the country, there may be a shortfall in usage of the remaining available capacity after the requirements of the host institutes are fulfilled.
- Some North Sea countries are reconsidering the number of RV they retain, and are also considering possible replacement, upgrading, decommissioning or new building plans (see below).
- There is an increasing need for a stronger management approach to the cruises and national/EU transparency in the pricing and sharing costs.
- For some countries there are insufficient funds for full utilisation of the RVs capacity, sometimes resulting in vessel utilisation of less then 180 days per year.
- The average running cost of the larger vessels, excluding capital depreciation costs, is of approximately two MEuro per ship and per year.
- ICES Working Groups are already working on standardisation of international data collection from programme cruises, but these are set up from a research/scientific point of view, rather than for the efficiency of operation.
- From the management point of view there is an urgent need for a multi-year cruise, manning and new-building strategy to co-ordinate the national plans as specified per country.

The Atlantic (essentially Gulf of Biscaye) and the Mediterranean Sea (Paris workshop, May 2004).

Utilisation of available time on RVs and use of specialised vessels:

- In Greece, HCMR is hiring a professional fishing vessel. HCMR owns only two RVs which are over-utilised by scientists, even in the field of archaeology. The available time can be evaluated as of 10 days per year.
- In Portugal, the RVs currently in operation are old, but funds to replace and/or to modernise them appear to be easily obtainable.
- In Spain, the RV *Vizconde de Eza* is being managed and operated by the General Secretariat for Fisheries which commits the IEO to various cruises.
- In France, available time on the RV *Thalassa*, which is a multi-purpose vessel, is occupied for oceanographic cruises. No shiptime is available for the next 3 years. This is partly due to the pressure induced by European oriented campaigns (IBTS, PELGAS, PELACUS and EVHOE). Year 2006 will be particularly intense in this respects.

Cost reduction and transit time restriction:

- Local and regional arrangements are probably the only ones that could be efficient.
- Exchange forum in order to valorise the transit time must be adopted.

Common investment in new vessels and/or equipments:

As funds are not trans-national, the issue is beyond their scope. This displays the fact that if there are barriers to collaboration between European countries, this is also the case within the European structure, where some tolls are provided for a better integration and to reduce overlapping when others are inducing the opposite.

As a matter of fact, the only potential partners for implementing common RVs in the south Atlantic and Gulf of Biscay are Spain and France.

Standardisation:

Peer review procedures are very limited in other fleets than the French one. A harmonisation of scientist request for cruise is not common within the various teams that have access to the RVs. In Spain, a coordinating committee for fleet implementation was due to be organised, but has not met yet. In Greece, scientists pay a lump sum from their own budget to have access to fleet, which is not the case in France where Ifremer is in charge of covering the whole cost of implementing the fleet for the scientific community.

In practice, the Greek fleet employs foreign seamen, which gives a very attractive cost for days at sea. The great variability of the running costs among the different national fleets seems to be a huge barrier to a common implementation of the fleet and a brake to transferring scientific cruises from one fleet to another.

Martin Scholten
President of EFARO

Appendix 7 – List of Acronyms

ADCP
Automatic Doppler Current Profiler

AO
Announcement of Opportunities

AUV
Autonomous Underwater Vehicle

AWI
Alfred-Wegener-Institut für Polar- und Meeresforschung

BMBF
Bundesministerium für Bildung und Forschung

BONUS
Baltic Sea Research Funding Collaboration

CIIMAR
Centro Interdisciplinar Investigaçao Marinha Ambiental

CSIC
Consejo Superior de Investigaciones Científicas

EC
European Commission

EFARO
European Fisheries and Aquaculture Research Organisation

EMSO
European Multidisciplinary Seas Observation

ERA-NET
European Research Area Network

ERVO
European Research Vessel Operator

ESFRI
European Strategic Forum for Research Infrastructure

ESONET
European Seas Observatory NETwork

EVHOE
Evaluation Halieutique de l'Ouest Européen (Halieutic Resources Assessment-West Europe)

HCMR
Hellenic Centre for Marine Research

IAMC
Instituto per l'Ambiente Marino Costiero

IBTS
International Bottom Trawl Survey (North Sea)

ICES
International Council for the Exploration of the Sea

IEO
Instituto Español de Oceanografía

IFREMER
Institut Français de la Recherche pour l'Exploitation de la Mer

IMR
Institute of Marine Research

ISOM
International Research Ship Operator Meeting

JGOFS
Joint Global Ocean Flux Study

MISG
Marine Infrastructures Strategy Group

NATO
North Atlantic Treaty Organisation

NERC
Natural Environment Research Council

NIOZ
Nederlands Instituut voor Onderzoek der Zee

NOAA
National Oceanic and Atmospheric Administration

OBS
Ocean Bottom Seismometer

OFEG
Ocean Facilities Exchange Group

OFWG
Ocean Research Fleets Working Group

POGO
Partnership for Observation of the Global Oceans

ROV
Remotely Operated Vehicle

RV
Research Vessel

UNOLS
University National Oceanographic Laboratory System

WOCE
World Ocean Circulation Experiment

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Printing: IREG Strasbourg – March 2007
ISBN 2-912049-62-8

Marine Board - ESF Member Organisations

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Print run: 2000 – March 2007