EUROPEAN SCIENCE FOUNDATION
SETTING SCIENCE AGENDAS FOR EUROPE

MARINE BOARD

Position Paper 11

Response to the European Commission's Green Papers:
(i) *Towards a future Maritime Policy for the Union: A European vision for the oceans and seas*
(ii) *The European Research Area: New Perspectives*

November 2007

www.esf.org/marineboard

Marine Board – ESF

The increasing interdependence of marine research policies and programmes at national and at European levels, as well as the rapidly changing environment of European marine sciences, call for a new approach to the development of European research strategies. To this end, the Marine Board, established in 1995 by its Member Organisations, facilitates enhanced co-ordination between the directors of European marine science organisations (research institutes, funding agencies and research councils) and the development of strategies for marine science in Europe. The Marine Board operates within the European Science Foundation.

As an independent non-governmental advisory body, the Marine Board is motivated by, and dedicated to the unique opportunity of building collaboration in marine research. The Marine Board develops insight, recognising opportunities and trends, presenting compelling and persuasive arguments that shape the future of marine research in Europe.

The Marine Board provides the essential components for transferring knowledge for leadership in marine research in Europe. Adopting a strategic role, the Marine Board serves its Member Organisations by providing a forum within which policy advice to national agencies and to the European Commission is developed, with the objective of providing comparable research strategies at the European level. In seeking to develop and enhance the understanding and management of marine research, the Marine Board delivers a balanced, consistent and effective programme of foresight initiatives, delivered as topic specific position papers, which provide information for policy makers at national and European level. As a major science policy think-tank, the Marine Board:

- *Unites the outputs* of advanced marine research;
- *Provides insights* necessary to transfer research to knowledge for leadership and decision making;
- *Develops foresight* initiatives to secure future research capability and to support informed policy making;
- *Places marine research* within the European socio-political and economic issues that profoundly affect Europe.

The Marine Board operates via four principal approaches:

- **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 in these fields;
- **Forum:** Bringing together 28 marine research organisations (four of which are new associated members) from 20 European countries to share information, to identify common problems and, as appropriate, find solutions, to develop common positions, and to co-operate;
- **Strategy:** Identifying and prioritising emergent disciplinary and interdisciplinary marine scientific issues of strategic European importance, initiating analysis and studies (where relevant, in close association with the European Commission) in order to develop a European strategy for marine research;
- **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.

"Vision is the art of seeing what's invisible to others" (Jonathan Swift, Class of 1686, Trinity College Dublin). The Marine Board, recognising that the challenges associated with the development of a vision for marine science throughout Europe requires extensive collaboration, works with its Member Organisations and with agencies at the European level, to contribute to the development of this multifaceted vision for marine science.

Marine Board's responses to the European Commission's Green Papers:

(i) *Towards a future Maritime Policy for the Union: A European vision for the oceans and seas*

(ii) *The European Research Area: New Perspectives*

Developed from existing Marine Board–ESF publications and discussions with Marine Board Delegates:

Executive Committee:
Lars Horn, Antoine Dosdat, Edward Hill, Kaisa Kononen, Jan de Leeuw, Jan Mees, Kostas Nittis.

Delegates:
Jean-Marie Beckers, Colpan Beken, Alessandro Crise, Jerzy Dera, Annalisa Griffa, Kerstin Johannesson, Karin Lochte, Beatriz Morales Nin, Tore Nepstad, Geoffrey O'Sullivan, Nicole Papineau, Gregorio Parrilla, Bo Riemann, Mario Ruivo, Raymond Schorno, Bodo von Bodungen, Mike Webb.

Editor:
Niamh Connolly, Executive Scientific Secretary, Marine Board

Editorial team:
Jan-Bart Calewaert, Aurélien Carbonnière, Maud Evrard, Nicolas Walter, Science Officers, Marine Board

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Rationale

Addressing strategic issues, the Marine Board serves its Member Organisations by providing a forum within which policy advice to national agencies and to the European Commission is developed, with the objective of providing both comparable and compatible marine research strategies at the European level.

The increasing interdependence of marine research policies and programmes at national and at European levels, as well as the rapidly changing environment of European marine sciences, call for a new approach to the development of European research strategies. To this end, the Marine Board, established in 1995 by its Member Organisations, facilitates enhanced co-ordination between the directors of European marine science organisations (research institutes, funding agencies and research councils) and the development of strategies for marine science in Europe.

As a major science policy think-tank providing insights necessary to transform research into knowledge for leadership and decision making, the Marine Board recently responded to two major consultation processes launched by the European Commission, which dealt with:

- the Green Paper[1] "Towards a future Maritime Policy for the Union: A European vision for the oceans and seas" (June 2006)[2]
- the Green Paper "the European Research Area (ERA): New Perspectives" (May 2007)[3]

The Marine Board welcomed the European Commission's proposal to develop an integrated European Maritime Policy and associated research strategy as well as to further strengthen the European Research Area. The Marine Board appreciated the opportunity to comment on these inter-related Green Papers.

1. Green Papers are documents published by the European Commission to stimulate discussion on given topics at European level. They invite the relevant parties (bodies or individuals) to participate in a consultation process and debate on the basis of the proposals they put forward. Green Papers may give rise to legislative developments that are then outlined in White Papers – Europa Glossary.
2. Available at: http://ec.europa.eu/maritimeaffairs/pdf/com_2006_0275_en_part2.pdf
3. Available at: http://ec.europa.eu/research/era/pdf/era_gp_final_en.pdf

Consultation process overview

1. Maritime Policy

"Towards a future Maritime Policy for the Union: A European vision for the oceans and seas" (June 2006)

On 7 June 2006, the European Commission adopted a Green Paper on a Future Maritime Policy for the European Union. The Green Paper examined all economic activities of Europe which are linked to, or impact on, the oceans and seas, as well as all the policies dealing with them, with a view to finding the best way to extract benefit from the oceans in a sustainable manner.

The Maritime Policy Green Paper highlighted a number of areas where integrated effort might either provide benefits for a number of individual sectoral policy area or help to resolve conflicts between them. The Green Paper posed a number of questions, ranging from the fundamental "Should the EU have an integrated maritime policy?" to more detailed issues. The European Commission sought answers to these questions and solicited further new ideas in a public consultation which lasted until 30 June 2007.

A **Summary Statement** (*see Chapter 1*) based on the Marine Board's discussions was officially submitted to the European Commission in May 2007. In this Summary Statement, the Marine Board states that it recognises that a European Maritime Policy will be a very powerful mechanism for promoting and sustaining marine science and technology in support of European economic development. The Marine Board particularly acknowledges the collaboration and consensus achieved by the European Commission Services' DGs in the development of the Maritime Policy. Given the statement that the Maritime Policy should be supported by excellence in marine scientific research, and its need to be open and transparent, it is evident that collective action is now required from the marine research community. This should be developed in parallel with appropriate cross-cutting mechanisms to coordinate marine research across the themes and programmes in the seventh Framework Programme (FP7).

2. European Research Area

"The European Research Area (ERA): New Perspectives" (May 2007)

In a complementary development, the European Commission published the Green Paper "The European Research Area (ERA): New Perspectives", launching a broad institutional and public debate on what should be done to create a unified and effective European Research Area, which would fulfil the needs and expectations of the scientific community, business and

citizens. The public consultation on the ERA lasted from 1 May 2007 until 31 August 2007.

As highlighted by the European Commission in the Green Paper "*The European Research Area has become a key reference for research policy in Europe. However, there is still much further to go to build ERA, particularly to overcome the fragmentation of research activities, programmes and policies across Europe*".

Based on its response to the consultation process on the European Commission's Green Paper on the development of a Future European Maritime Policy (Towards a future Maritime Policy for the Union: A European vision for the oceans and seas, June 2006), the Marine Board issued a response (*see Chapter 2*) addressing the best way to deepen and widen the European Research Area in the frame of marine science.

Towards a European Marine Research Strategy – Marine Board perspective

In its responses to these two Green Papers, the Marine Board addresses the questions of relevance to its mandate and activities, focusing on marine research matters. **The Marine Board emphasises the need for a European Marine Research Strategy to support an integrated European Maritime Policy. Such a research strategy would identify priority challenges and opportunities for marine research, offer guidance on technology transfer to industry, promote the sustainable management of marine resources and coastal and ocean areas (both regionally and globally), enhance cooperation and partnership between Community and Member State R&D programmes, and advise on specialist marine scientific infrastructure needs.** The strategy should be founded on science to shape knowledge and ideas necessary to answer the challenges of the future.

Structure of report

In addressing the marine science and technology challenges posed by the Green Papers on the future European Maritime Policy and on the European Research Area, the Marine Board has consulted its Member Organisations.

Chapter 1 provides a synthesis of perspectives and discussions deliberated upon at Marine Board level, in addition to the research perspectives already summarised in the Marine Board's publication: Navigating the Future III [4] (November 2006). In its response, the Marine Board outlines 16 priority perspectives: 9 strategic (4 for immediate action), and 7 thematic (2 for immediate action).

In **Chapter 2**, the Marine Board welcomes the intention of the European Commission to embed and secure knowledge development within the needs of society and to maximise Europe's knowledge potential in all its dimensions (people, infrastructures, organisations, funding, knowledge circulation and global cooperation).

4. Available at: http://www.esf.org/research-areas/marine-board/publications.html

Chapter 1

Marine Board–ESF Summary Statement in response to the European Commission's Green Paper "*Towards a future Maritime Policy for the Union: A European vision for the oceans and seas*"

As submitted to the European Commission on 21 May 2007

Foreword

The Marine Board (representing 28 European marine research institutes and funding agencies from 20 countries – *see Annex IV*) welcomes the European Commission's proposal to develop an integrated European Maritime Policy and wishes to thank the European Commission for the opportunity to comment on the Green Paper.

The Marine Board recognises that a European Maritime Policy will be a very powerful mechanism for promoting and sustaining marine science and technology in support of European economic development. The Marine Board particularly acknowledges the collaboration and consensus achieved by the Commission Services' DGs in the development of the Maritime Policy. Given the statement that the Maritime Policy should be supported by excellence in marine scientific research, and its need to be open and transparent, it is evident that collective action is now required from the marine research community. This should be developed in parallel with appropriate cross-cutting mechanisms to coordinate marine research across the themes and programmes in the seventh Framework Programme (FP7).

In addressing the marine science and technology challenges posed by the Green Paper, the Marine Board has consulted its Member Organisations, some of whom have submitted their own responses. The following is a synthesis of responses received and the discussions deliberated upon at Marine Board level, in addition to the research perspectives already summarised in the Marine Board's publication: *Navigating the Future III* (November 2006).

The Marine Board emphasises the need for a European Marine Research Strategy to support an integrated European Maritime Policy. Such a research strategy would identify priority challenges and opportunities for marine research, offer guidance on technology transfer to industry, promote the sustainable management of marine resources and coastal and ocean areas (both regionally and globally), enhance cooperation and partnership between Community and Member State R&D programmes, and advise on specialist marine scientific infrastructure needs. The strategy should be founded on science to shape knowledge and ideas necessary to answer the challenges of the future. The Marine Board confirms its broad support for the research concepts outlined in the Commission's Background Paper: *Marine Related Research and the Future European Maritime Policy* (Background Paper No.8, November 2006).

In its response to the Green Paper, the Marine Board addresses the questions of relevance to its mandate and activities, focusing on marine research matters. The following is a summary of the Marine Board's position. It outlines 16 priority perspectives: 9 strategic (4 for immediate action), 7 thematic (2 for immediate action). A more detailed response is available on request.

Lars Horn
Chairman Marine Board

May 21 2007

Marine Research and the Future European Maritime Policy

The Marine Board welcomes the intention that the Future European Maritime Policy will be, as declared by Commissioner Borg:

- All embracing, aimed at developing a dynamic maritime economy;
- Based on the principles of sustainable development advocated in the Gothenburg Agenda (i.e. "*in harmony with the marine environment*");
- Based on sound marine scientific research and technology, thus supporting evidence-based policy making and furthering the knowledge-economy (Lisbon Agenda);
- Taking account of the human communities that derive their livelihood and quality of life from proximity to and use of marine resources.

The marine science and technology community is poised to play a significant active role in achieving the vision for Europe as outlined in the Green Paper and in supporting the various existing policy initiatives agreed by EU Member States (e.g. Lisbon Agenda, Barcelona Convention, Gothenburg Agenda, Marine Thematic Strategy etc.).

Figure 1. Maritime Policy Green Paper Publication

European Research Area – ERA

The European Research Area (ERA), combining the internal market for researchers, effective European-level partnerships in national and regional activities, programmes and policies, and initiatives implemented at the European level, is a key reference point for research policy in Europe. The marine science and technology sector is a major contributor to the effective establishment and operation of the European Research Area. In this context, the importance of the parallel development of a pan-European marine research strategy to support the Maritime Policy must be emphasised. **The Marine Board supports the placing of science and technology at the core of the Maritime Policy, developing a knowledge-based approach in traditional and emerging sectors.** Securing effective leadership in marine science and technology which would engage in regular dialogue with Member State and EU level policy makers is crucial to the development of the marine component of the ERA. Furthermore, effective links have to be made with research initiatives funded through the European Research Council (ERC), and with the proposed "knowledge innovation communities" to be created by the European Institute of Technology (EIT).

The Marine Board recognises that the marine research community must rise to the challenge of building a viable European marine research area, which would be properly embedded within the overall European Research Area. Effective delivery of this objective will require enhanced partnerships of various configurations: partnerships between the Commission and the Member States at both the strategic and funding levels; partnerships between academia, public research institutes and the private sector; and partnerships between existing pan-European organisations (e.g. CIESM, EFARO, EuroGOOS, ICES, Marine Board, Waterborne TP etc.).

In developing the marine science and technology component of an integrated European Maritime Policy, the Marine Board makes the following recommendations, categorised as (i) Policy and Management Initiatives (green) or (ii) Research Priorities (blue):

Policy and Management Initiatives

1. Elaboration of a European Marine Research Strategy*

The Maritime Policy will require an associated European Marine Research Strategy, to inform the development of knowledge in support of the Maritime Policy, the Marine (Environment) Thematic Strategy and the ERA. **The Marine Board supports the development of a long-term marine vision and research strategy (for up to 20 years; with periodic review, e.g. quinquennial).**

The Research Strategy should be initiated in partnership between the Commission Services and the Member States. It should be developed through consultation with the research community, relevant pan-European organisations, and intergovernmental organisations, to identify priorities (e.g. climate change, renewable ocean energy, blue-biotechnology, etc.) beyond the seven year horizon of the current Framework Programme, and beyond national and sectoral priorities. The Marine Research Strategy would necessarily include a balance of economic, social and environmental objectives. It would also address the adequate availability and continued supply of competent researchers, recognising the need for a high level of mobility between disciplines and countries.

The recently published *Navigating the Future III* (Marine Board Position Paper 8, November 2006) summarises European marine research priorities and provides a foundation from which to elaborate the future marine research strategy.

Figure 2. Navigating The Future III – Marine Board Position Paper 8 (November 2006)

The Marine Board recommends that it is timely to revisit the Galway Declaration[5], and to develop a cohesive vision resulting in the adoption of a new declaration on marine science and technology – endorsed by the research community – in support of economic development, and that it is necessary to create support mechanisms to implement the declaration's objectives[6].

2. Widening the International Dimension of the Maritime Policy

The international dimension of the Maritime Policy is particularly relevant at the regional level, with reference to collaboration with non-EU countries bordering European Seas (many of which are developing countries, e.g. those bordering the Mediterranean and Black Seas). In its commitment to addressing global challenges, **the EU must engage these countries in the process of the Maritime Policy as early as possible, to ensure their partnership in the implementation process. Transfer of experience at the level of regional seas for example from the Baltic and Atlantic to the Mediterranean and Black Seas and vice-versa should be a priority.**

3. Enhancing Partnerships and Synergies: between existing organisations of marine stakeholders

Willing and constructive interactions are extant between existing nodes of expertise involved in research, monitoring, infrastructure management, and policy development, whether through pan-European inter-agency networks (e.g. EFARO, EuroGOOS, Marine Board etc.) or inter-governmental organisations (e.g. ICES, CIESM). The challenge for these organisations is to expand the scale of their activities to ensure sustained and long-term action in support of the Maritime Policy. They have a collective responsibility to work together, combining the resources, facilities and expertise of their Member Organisations, towards informing strategy and shaping evidenced-based policy for future generations.

* Denotes for immediate action.

5. The Galway Declaration 2004 (developed at the EurOceans 2004 Conference) emphasised the importance of marine science and technology in supporting sustainable economic, social and environmental development
6. Post-submission note: in June 2007 the Aberdeen Declaration was developed and endorsed by the marine research community. The Aberdeen Declaration calls for, *inter alia*, the development of a European marine research strategy, and the establishment of a network of existing networks of marine research; *see Annex I*

The inherent complementary nature of these organisations should be further harnessed to provide Europe with knowledge-based inter-disciplinary advice. **Building the marine component of the ERA should be elaborated on the basis of strengthening and making more effective the partnerships between existing organisations, rather than necessarily creating new ones.** Providing a flexible and reactive platform for enhanced partnerships would promote the timely delivery of consolidated strategic advice to the Commission Services, reducing fragmentation and duplication, resulting in added value, while supporting subsidiarity and avoiding risks associated with centralisation. **Mechanisms to increase dialogue between the Commission Services and external nodes of advice should be elaborated.**

Developing a platform for enhanced partnership may require adaptation of institutional structures and methods of collaboration, for example through the establishment of a common point of interaction for secretariats of pan-European organisations. In this context it is noteworthy that the Secretariats of the Marine Board and EFARO will co-locate at new offices, in Ostend, from autumn 2007.

Such a partnership platform should also activate key events, such as an annual conference on marine science and technology, including maritime affairs, to identify the emerging research needs of the Maritime Policy, and support interdisciplinary interaction between the research community, industry and policy makers. The resultant enhanced partnership between industry and public funding agencies should ensure elaboration of research efforts beyond the traditional academic focus, as well as enhanced synergy between the development of Member States' research programmes and Community funding. The platform would also facilitate interactions with the Commission Services and other organs of the EU, national governments, industry etc.

The proposed knowledge and innovation communities of the European Institute of Technology will also offer a framework within which to create such partnerships, and must be engaged with.

4. Research Links: with policy makers and industry – securing uptake and impact

Outputs from the marine research community should be more readily available for use by policy makers. An effective channel for focussed dialogue and knowledge-sharing between scientists and policy makers (turning data into information and knowledge), is necessary to ensure impact, uptake and enhanced use of scientific results, thus accelerating exploitation of research towards development of new products and services, and advancing knowledge for improved governance and societal benefit.

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Figure 3. Ostend harbour (Belgium)

Increased interactions between the public research community and industrial research are necessary, both with maritime industries and with technology industries, in support of science and innovation. Private companies should be mobilised to access instruments/schemes in FP7 (e.g. European Technology Platforms). The establishment of knowledge transfer networks, to facilitate two-way flow (knowledge and expectations) between academia, industry and government agencies may be one possible mechanism.

5. Cross-cutting Interactions in FP7 – the way forward*

The coordination of marine related research within the Commission Services, (between the different units within DG RTD and between the relevant DGs, including RTD, FMA, ENV, TREN, and ENTR) is of paramount importance. The development of the Maritime Policy in tandem with FP7, and the fact that the new funding period of the structural funds covers the FP7 period (2007-2013), should be used to promote enhanced synergy between all three. **Mechanisms should be developed to maintain the inter-DG collaboration involved in developing Maritime Policy Green Paper.**

The Marine Board emphasises that the cross-cutting prioritisation secured for marine science and technology throughout the themes in FP7 will require development of effective operational mechanisms for implementation. Cross-cutting initiatives will rely heavily on external advice to ensure that topics addressed are relevant and targeted at improved capacity building, emphasising the importance of partnerships between

Figure 4. Seminar on Marine Science and Technology in FP7 (16 January 2007, Brussels)

nodes of external advice. **Mechanisms such as those discussed at the Seminar on Marine Sciences and Technologies in FP7 (Brussels, 16 January 2007), to improve dialogue between the Commission Services, FP7 Expert Advisory Groups and the Member State representatives on the FP7 Programme Committees should be actively pursued.** It will be necessary to monitor the effectiveness of cross-cutting initiatives, through regular review assessments and annual audits of marine research across all FP7 Themes (10) and Specific Programmes (4) (as well as JRC), and adapt future calls, where necessary.

6. Enhanced Interaction and Partnerships between Member State programmes and Community funding

In recognition of the needs and expectations of the Maritime Policy, and working towards coherence between national and regional programmes and research priorities of European relevance, it is increasingly important to develop a partnership approach to programmes funded by FP7 and those funded nationally[7]. To this end, the use of ERA-NETs, Technology Platforms and Article 169 is pertinent. It is incumbent on Member State and Community research policy makers to work towards reduced fragmentation (while retaining diversity) and enhanced coherence between initiatives.

Enhanced use of ERA-NETs and European Technology Platforms (schemes):

- **Mechanisms towards enhancing the dialogue and collaboration between marine-related ERA-NETs are necessary and should be facilitated by the Commission Services**, towards ensuring that strategies are targeted directly, and improved cohesion between national scheduling of budgets and projects.
- **Increased dialogue with the European Technology Platforms and stakeholder groups to facilitate greater awareness of industry needs**, beyond the academic focus of priority setting and delivery of research output.
- Both schemes should work together in contributing to the proposed research strategy. **Mechanisms should be elaborated to ensure cohesion between research strategies and programmes elaborated by ERA-NETs and European Technology Platforms, and those elaborated by FP7.**

7. Research Infrastructures: developing capacity and partnership

Research infrastructures are estimated to account for approximately 50% of total research and development expenditure in marine science. Research vessels, fundamental to furthering marine research, represent very expensive assets with high development and implementation costs; continued investment is vital to increase Europe's research capacity (the Marine Board report on research vessels estimated that the cohort of Regional Class vessels will decline by 60% in 10 years if investment for new vessels is not secured)[8].

Figure 5. The *Pelagia* Research Vessel operated by The Netherlands Institute for Sea Research (NIOZ) is a 66 m multipurpose Research Vessel developed for oceanographic research in coastal seas, on continental shelves and in the blue ocean.

Strategic leadership and an integrated approach to investments and use of large facilities are essential to allow Europe to continue to deliver world-class facilities which are integrated, networked and accessible to research teams from across Europe. Major infrastructures could be developed and used in the form of joint

7. 83% of Europeans consider that there should be more coordination of research activities between Member States of the European Union. Eurobarometer: Europeans, Science and Technology, June 2005.
8. See Marine Board Position Paper 10 "*European Ocean Research Fleets: Towards a Common Strategy and Enhanced Use*".
9. OFEG: Ocean Fleets Exchange Group: France, Germany, Netherlands, Norway, Spain, UK
10. See Marine Board Position Paper 10 "*European Ocean Research Fleets: Towards a Common Strategy and Enhanced Use*"

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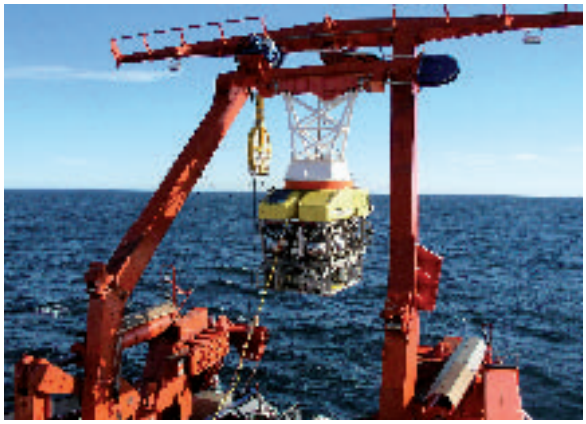

Figure 6. An example of interoperability: deepwater Remotely Operated Vehicle (ROV) Victor owned by Ifremer (France) on board of Research Vessel (RV) *Polarstern* (Germany)

European ventures. Despite the current lack of legal structures to implement pan-European partnerships, collaborative initiatives on the use of national infrastructures on a trans-national basis have been elaborated by groups such as OFEG[9]. **A coherent pan-European approach to infrastructure policy – with enhanced partnership in investment, development and use – is required in Europe to deliver solutions to meet the diverse needs of organisations active in marine research**[10].

In this context, it will be essential to:

- **Optimise the planning and use of infrastructures: support cooperation and partnerships between countries** (e.g. through the marine projects detailed in the ESFRI roadmap);
- **Support the development and management of the European research fleet and associated heavy equipment (e.g. ROVs/AUVs).**
- **Facilitate optimal use, and inter-operability, for existing equipment.**

8. European Marine Observation and Data Network*

The Marine Board supports the establishment of a European Marine Observation and Data Network (EMODN) as elaborated in Background Document 4a. The EMODN should build on existing networks for oceanographic data (mainly national initiatives under the coordination of GOOS, GEOSS), on the data integration mechanisms being developed by the SeaDataNet initiative, on the marine core services aspect of GMES and

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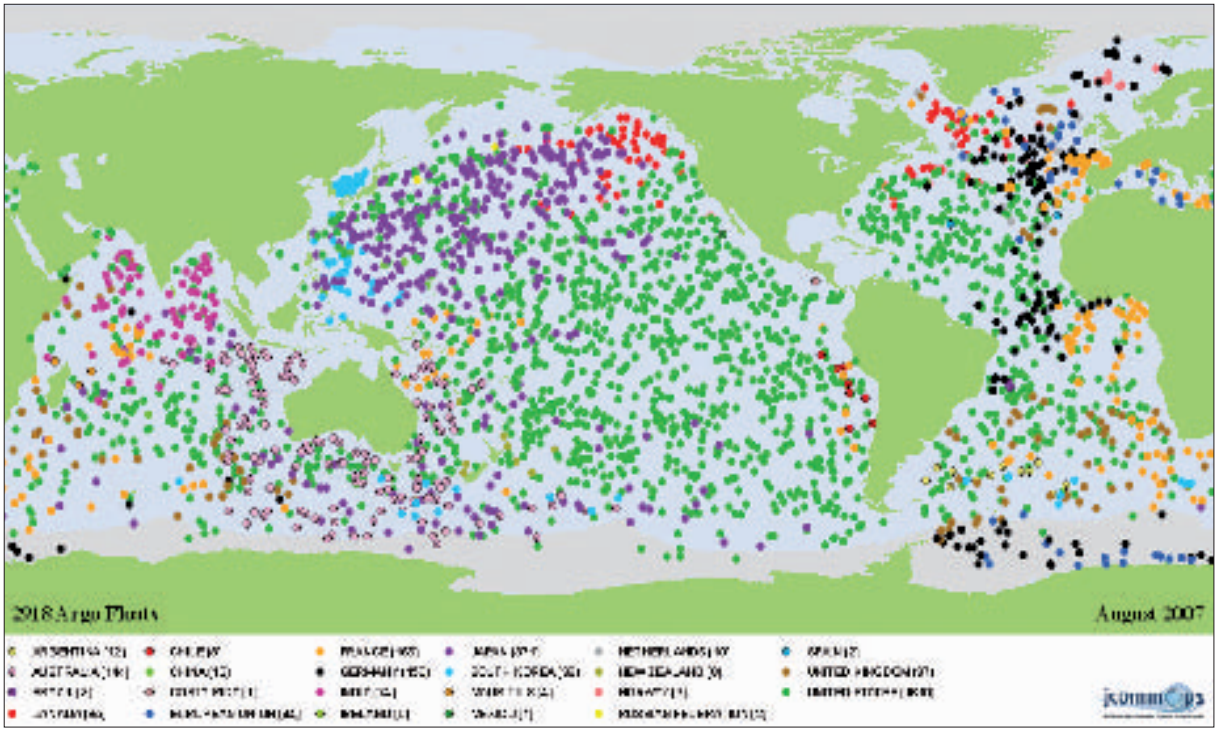

Figure 7. Global distribution of Argo profiling floats

* Denotes for immediate action.

projects and initiatives such as MERCATOR, MERSEA and EuroGOOS. It should focus on integrating existing marine observation facilities, improving operability and access to data. It should be a source of primary and processed data for public institutions, and commercial providers. Member States should take the responsibility to maintain these systems in the long term, while the EU should provide support to fill gaps and provide coordination mechanisms. Data standards in marine research are also necessary. Mechanisms to ensure long term, secure financing of all relevant marine data collection should be established.

In the context of developing the tools to manage our seas and oceans, and establishing EMODN, the Marine Board also supports as necessary the development of:

- **A European Multidisciplinary Seafloor Observatory (EMSO);**
- **Euro-Argo;**
- **A European Atlas of the Seas as a flagship project, to include marine science and technology expertise in seabed surveying, mapping, classification, information technologies and 3-D visualisation.**

9. Quantifying Marine Resources*

Little comparable data is available to ascertain the actual benefit of the maritime economy to individual Member States, or to measure trends over time; this is a major gap to address when developing a European Maritime Policy. **The Commission, working with Member States, should compile detailed annual socio-economic statistics and trends on the value of marine resources, including annual investment in marine research and technology development.**

* Denotes for immediate action.

Research Priorities [11]

10. Climate Change*

Climate change acts as a global driver on ecosystem dynamics, the understanding of which will be crucial to our management of the oceans' biotic resources (e.g. ecosystem approach to fisheries). Reducing the risks of climate change and evaluating its impact on marine ecosystems is a most pertinent and pressing example of the provision of responses to issues of a common global concern requiring collective action for local implementation. **It is vital to develop models for forecasting climate change at the regional level** (see Marine Board publication: *Impacts of Climate Change* [12]). **Research on the impacts of climate change on the marine environment is essential (to address sea level rise, erosion, acidification, biodiversity and ecosystem functioning), and the associated impacts of increased storminess and storm surges, on Europe's coastal communities (given that over 40% of Europe's population live on the coast) and resources is of primary importance.**

11. Renewable Energy*

Offshore wind energy, ocean currents, thermal energy, waves and tidal movements represent a source of renewable and clean energy, the potential of which is yet to be adequately quantified and realised. **The develop-**

Figure 8. Wind farms in the Scheldt Estuary, Vlissingen

11. See Marine Board Position Paper 8 "Navigating the Future III".
12. See Marine Board Position Paper 9 2007 "Impacts of Climate Change on the European Marine and Coastal Environment – Ecosystems Approach"

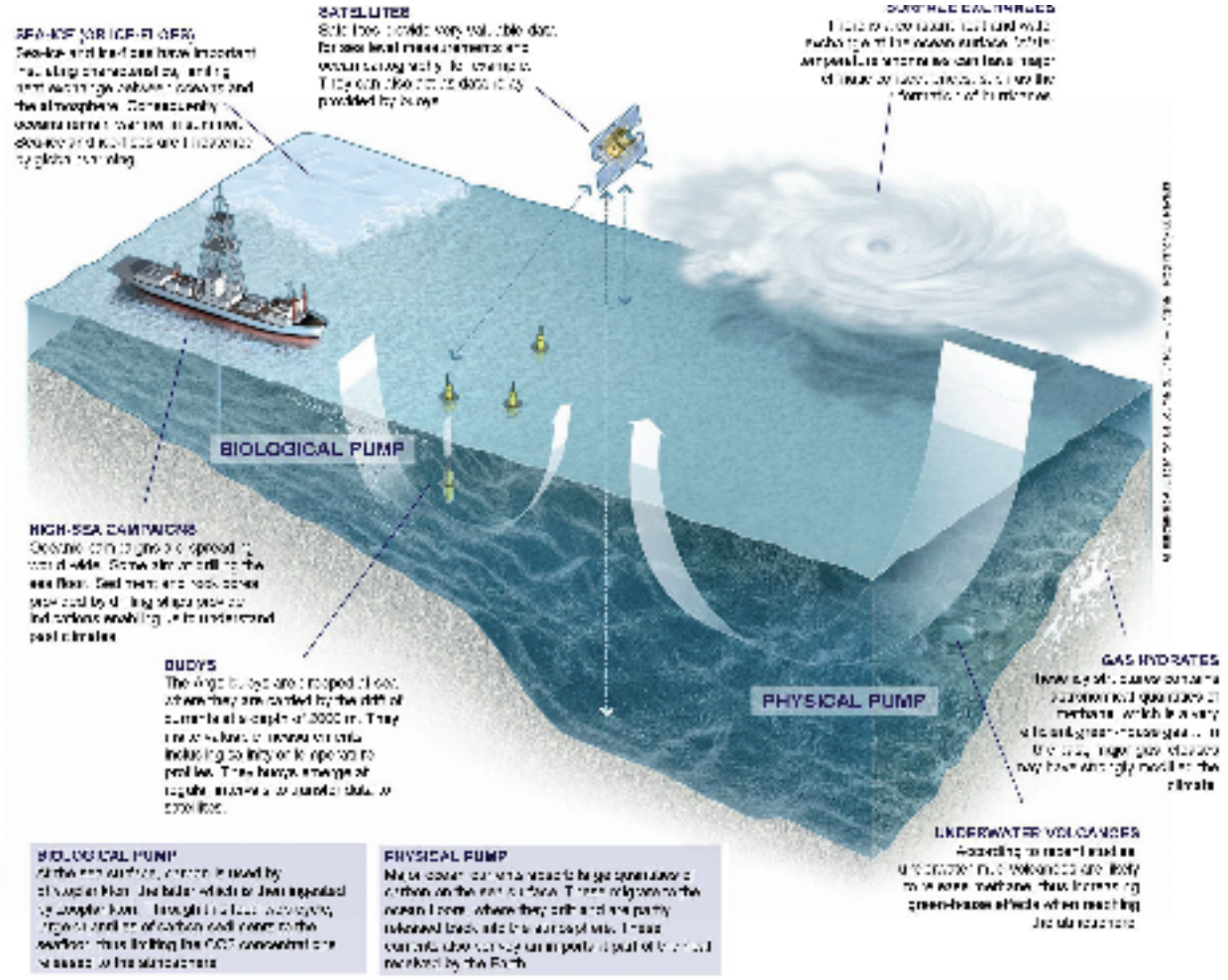

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Figure 9. Ocean climate interactions

ment of renewable energy requires active partnership with industry, and support for the development of innovative technologies. Research efforts are required to develop innovative technologies, processes and practices to harness renewable energy sources and to develop energy solutions, for example, to demonstrate the possibility of offshore wind energy installations. A European renewable energy policy must be developed.

12. Ecosystem Approach to resource management

The science and technology needed to support the challenges of the Common Fisheries Policy include development of common indicators and indices of multi-stock assessment, ecological health and functioning of habitat types, etc. **Promoting the adoption of an ecosystem-based approach to fisheries management, notably through the use of area-based management tools, is a priority.** The Ecosystem Approach is also crucial in implementing the Marine Thematic Strategy. Key issues include enhancement of links with socio-economic issues, and evaluating the impact of Marine Protection Areas and the need to protect marine biodiversity, and sustainable management of deep-sea resources.

Figure 10. Laboratory purification of marine bacterial strains

13. Biodiversity; Blue-biotechnology

Support towards describing ocean biodiversity should continue within the frame of the Census of Marine Life (CoML) initiative. There should be increased effort to apply the most recent gene sequencing technologies to differentiate the range and inter-relationships of marine species. Links should be developed between numerical taxonomy, expert systems and genomic techniques.

Europe should actively support networks and partnerships between marine biotechnology R&D groups and the industrial biotechnology sector, to identify and pursue opportunities such as high-throughput techniques for the development and assessment of new biomaterials and pharmaceuticals, development of core capabilities in marine taxonomy, marine genomics and post-genomics, natural products chemistry, chemo-genomics and bioinformatics.

14. Ocean Observing, Monitoring and Forecasting; Critical Technologies

The improvement of ocean forecasting and modelling capabilities and the development of useable operational services is key to improving safety at sea. **Multi-decadal funding is required for the development and implementation of multipurpose systems (e.g. early warning systems for natural hazards) and for operational oceanography. Techniques and services to detect and monitor oil spills and predict drift patterns of lost containers have to be implemented.**

Research on marine technology should be supported to: further assess, convert and apply novel miniature sensors arising from developments in physics, bioanalytics, and nanotechnology; transfer new developments from advanced material science to marine technologies; develop long-lived, easy to use and cost-effective in situ instruments, including novel sampling devices such as micro-sampling devices.

15. Deep-Sea Frontiers

The deep-sea floor represents a complex inter-linkage of physical, geological, chemical, biological and microbial processes. Further insights into the coupling of the deep-sea bio-geosphere and submarine bedforms are necessary. **An integrated approach to research on European ocean margins and their ecosystems, including research on: sediment transport and fluxes, climatic control and feed backs in the deep-sea, development and conservation of deep sea ecosystems, observation and monitoring, needs to be developed.** Such a cohesive research approach would benefit from common use of infrastructures used in international, national and European initiatives.

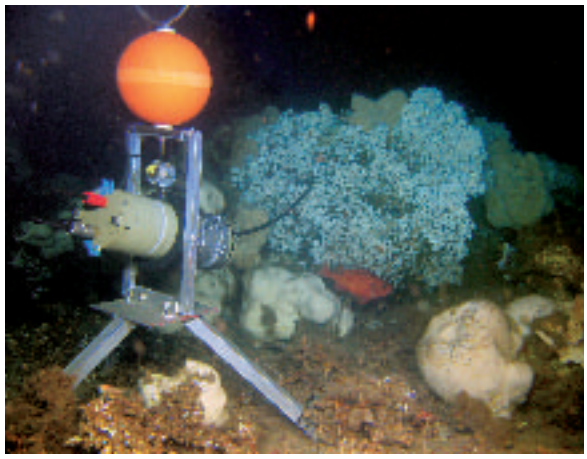

Figure 11. Camera used to photograph deep-sea coldwater polyps

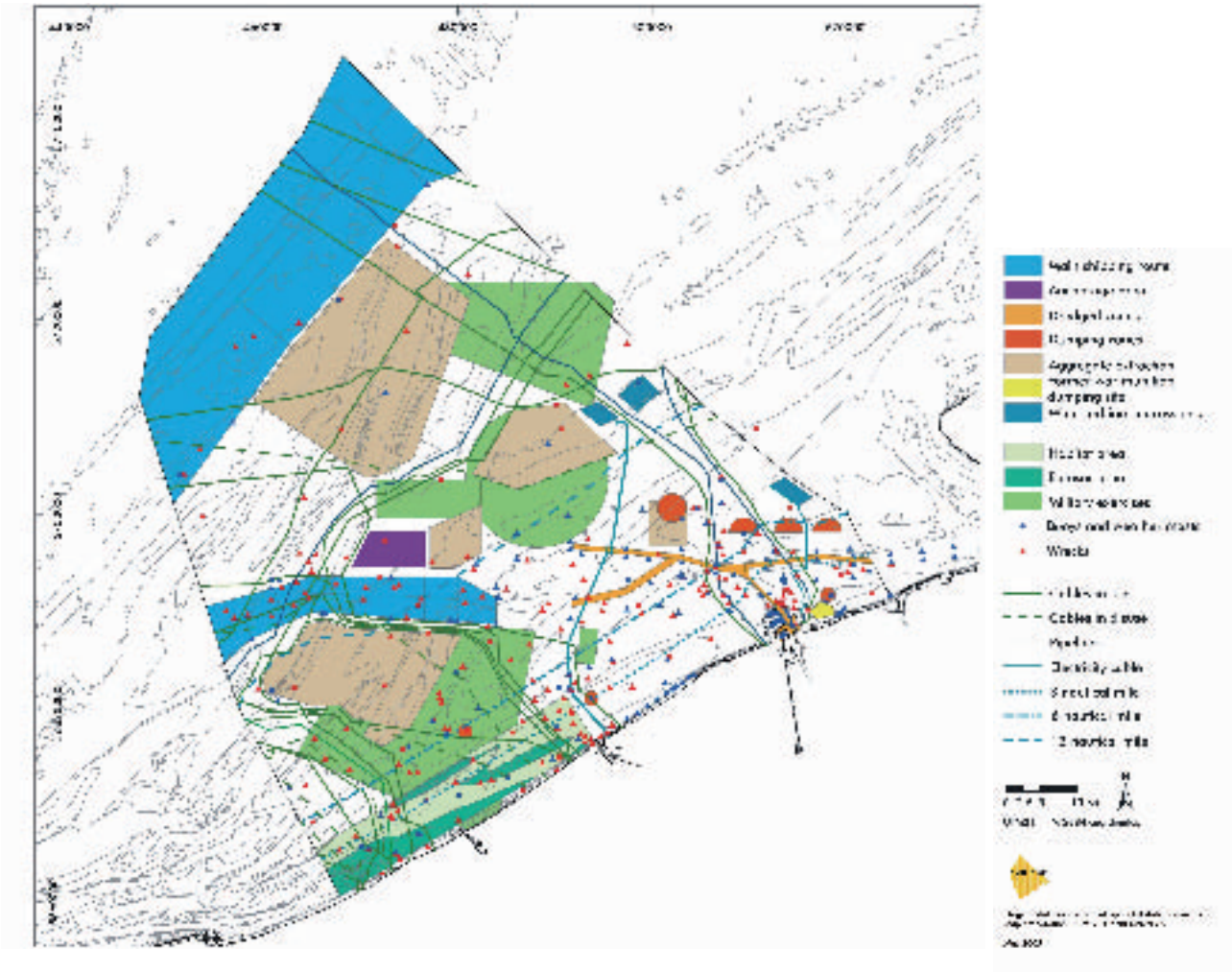

Figure 12. Different uses of the Belgian Part of the North Sea (BPNS). Map: Maritime Institute – Ghent University. Adapted from Maes, F., Schrijvers, J. & Vanhulle, A., (red.), A Flood of Space. Towards a Spatial Structure Plan for the Sustainable Management of the North Sea, Brussels, Belgian Science Policy (2005).

16. Marine Spatial Planning (MSP); Integrated Coastal Zone Management (ICZM)

MSP methodologies should be developed to evaluate the economic impacts of: (i) implementing new policies; (ii) effects of ecosystem changes on resource characteristics; and (iii) the socio-economic drivers of fisheries and aquaculture activities. Interdisciplinary research is required to address the challenge of implementing Integrated Coastal Zone Management (ICZM) and marine spatial planning. **There is a need for an EU-wide mechanism for comparative analysis and exchange of best practice in ICZM.**

Chapter 2

Marine Board–ESF Statement in response to the European Commission's Green Paper "*The European Research Area: New Perspectives*"

As submitted to the European Commission on 31 August 2007

Marine Research and the New Perspectives of the European Research Area

In its response to the consultation process on the European Commission's Green Paper on the development of a Future European Maritime Policy (*Towards a future Maritime Policy for the Union: A European vision for the oceans and seas*, June 2006), the Marine Board welcomes the intention of the European Commission to root knowledge development within the needs of society and to maximise Europe's knowledge potential in all its dimensions (people, infrastructures, organisations, funding, knowledge circulation and global cooperation).

As stated by European Union Commissioner for Fisheries and Maritime Affairs, J. Borg: "*Only excellence in marine research and technology would allow us to deliver the goal of a thriving maritime economy and the realisation of the full potential of sea-based activities in an environmentally sustainable manner*" (J. Borg, EU Commissioner for Fisheries and Maritime Affairs, EurOCEAN 2007 Conference, Aberdeen). The Marine Board recognises that marine science and technology represents a key element in the development of the European Maritime Policy. **The Marine Board emphasises that developing the science and technology component of the European Maritime Policy must be done in the context of the parallel development of the marine component of the European Research Area, and vice versa.** Such a dual approach to the development of both the Maritime Policy and the European Research Area would efficiently support the various existing policy initiatives agreed by EU Member States (e.g. Lisbon Agenda, Barcelona Convention, Gothenburg Agenda, Marine Thematic Strategy).

Figure 13. The EurOCEAN 2007 Science Policy Conference (22 June 2007) resulted in the Aberdeen Declaration

With the Aberdeen 2007 Declaration "*A New Deal for Marine and Maritime Science*", developed during the EurOCEAN 2007 conference, the marine and maritime research communities identified the strategic research and technological challenges faced by the European Union in the development of its Maritime Policy, and stressed that excellence in marine science and technology is crucial to the development of this future policy. These communities agreed on a vision for the future of European marine science and technology and called for urgent action by both the European Commission and the Member States to work in tandem to further develop and enhance a partnership with the appropriate stakeholders, with the objective to:

1. Initiate in 2008 a comprehensive and integrated European Marine and Maritime Science, Research, Technology and Innovation Strategy;
2. Establish an adequately resourced and sustained process to oversee the implementation and delivery of this Strategy within an holistic European Maritime Policy;
3. Initiate and support the necessary funding mechanisms, specialised infrastructures, data collection and information management, and capacity building essential to manage our on-going relationship with the oceans and seas.

The Marine Board considers that addressing these actions would further catalyse the essential development of the marine component of the European Research Area, with particular emphasis on the development of an integrated European Marine and Maritime Science, Research, Technology and Innovation Strategy, that would include:

- **Foresight activities** to identify new and emerging scientific challenges and opportunities;
- **Cross-sectoral, multinational and interdisciplinary research partnerships**;
- **Co-operation between research, industry and other stakeholders** to enhance knowledge and technology transfer and innovation;
- **Development of scientific and technology capacity** to strengthen the knowledge economy;
- **Shared use of, planning and investment in critical infrastructure** on a Europe-wide basis.

Associated background policy documents in support of the above include:

i) Prepared by the Marine Board, in consultation with stakeholders
- Aberdeen 2007 Declaration (June 2007)
- Statement from the Marine Board in response to the Green Paper "Towards a future Maritime Policy for the Union: A European vision for the oceans and seas" (May 2007)

- Marine Board Statement in support of discussions at the 16 January 2007 Seminar: "Marine Science and Technology in the 7th Framework Programme" (January 2007)
- Navigating the Future III (November 2006)
- Marine Board response to the European Commission proposals for the 7th Framework Programme (April 2006)

ii) Prepared by the ESF-EUROHORCs
- ESF-EUROHORCs response to the Green Paper: "The Commission Green Paper on the future of the ERA – Comments of EUROHORCs and ESF on the Green Paper" (August 2007)

Marine Component of the European Research Area

The European Research Area, combining the internal market for researchers, effective European-level partnerships in national and regional activities, programmes and policies, and initiatives implemented at the European level, is a key reference point for research policy in Europe; the marine science and technology sector is a major contributor to the effective establishment and operation of the European Research Area. In this context, **the importance of the parallel development of a pan-European marine research strategy to support the development of both the European Maritime Policy and the marine component of the European Research Area must be emphasised**. The elaboration of such a strategy, as proposed in support of the Future Maritime Policy, and ensuring its coherence with the development of the ERA, are essential. Securing effective leadership in marine science and technology which would engage in regular dialogue with both Member State and EU level policy makers is crucial to the development of the marine component of the ERA. Furthermore, effective links have to be made with research initiatives funded through the European Research Council, and with the proposed "knowledge innovation communities" to be created by the European Institute of Technology. The challenge for the European Commission, the Member States, and the European marine and maritime science and technology community is to support and ensure the preparation of a comprehensive and integrated research strategy which will identify short– and long-term priorities.

The Marine Board comments below on the overall priorities for the European Research Area, as well as on the specific aspects presented in the Green Paper:[13]

1. Realising a single labour market for researchers

Promoting human capacity building and the related issues of attractive research careers and researcher mobility is vital to ensure that appropriate highly-skilled researchers and support personnel are available to underpin developments in the marine and maritime research sector, including supporting the Lisbon Agenda. The concerns of early-stage researchers regarding barriers to transferability between countries and related disciplines should be addressed.

The Marine Board supports the concept of a single labour market for researchers as necessary. Given that greater than 90% of funding for marine research is secured at the national level, the involvement of the national funding agencies in development of the single market is vital. The role of the ERA-NET and EUROCORES instruments should be further elaborated to support the interaction between national funding agencies, since they address the matter of barriers to transferability of researchers. The Marine Board has initiated the MarinERA ERA-NET to raise awareness amongst national agencies towards implementation of this concept, and has also activated its member organisations to initiate and participate in other ERA-NETs and in EUROCORES.

2. Developing world-class research infrastructures

Research Infrastructures: developing capacity and partnership

Research infrastructures are estimated to account for approximately 50% of total research and development expenditure in marine science. Research vessels, fundamental to furthering marine research, represent very expensive assets with high development and implementation costs; continued investment is vital to increase Europe's research capacity. The Marine Board's report on research vessels (European Ocean Research Fleets – Towards a Common Strategy and Enhanced Use, March 2007) estimated that the cohort of Regional Class vessels will decline by 60% in 10 years if investment for new vessels is not secured.

Strategic leadership and an integrated approach to investment and use of large facilities are essential to allow Europe to continue to deliver world-class

13. Post-submission note: see Annex II "The European Commission's Blue Book, list priorities".

Figure 14. The Irish Marine Institute's Research Vessel *Celtic Explorer* is the national platform for offshore Marine Research. She is 65.5 m in length and accommodates 31 personnel, including 17-19 scientists

facilities which are integrated, networked and accessible to research teams from across Europe. Major infrastructures could be developed and used in the form of joint European ventures. Despite the current lack of legal structures to implement pan-European partnerships, collaborative initiatives on the use of national infrastructures on a trans-national basis have been elaborated by groups such as the Ocean Fleets Exchange Group (OFEG, which facilitates exchange of ship-time and equipment between several national agencies). **A coherent pan-European approach to infrastructure policy – with enhanced partnership in investment, development and use – is required in Europe to deliver solutions to meet the diverse needs of organisations active in marine research.**

In this context, it will be essential to:

- **Identify the specialised pan-European marine research infrastructures** (research vessels, subsea technologies, satellite and in-situ observing systems, sustained monitoring and data collection facilities, databases and information portals, high performance computing, modelling and land-based facilities) required to meet identified challenges and opportunities, especially those proposed by the current European Strategy Forum on Research Infrastructures (ESFRI) Roadmap, and Integrated Infrastructure Initiatives (I3);
- **Maximise the planning, and shared use and efficiency of Europe's research infrastructures; cooperation and partnerships between countries must be supported, a process initiated by ESFRI**, through the marine projects prioritised in the ESFRI Roadmap;
- **Support the development and management of the European research fleet and associated heavy equipment (e.g. ROVs/AUVs);**
- **Facilitate optimal use, and inter-operability, for existing equipment.**

3. Strengthening research institutions

Enhancing Partnerships and Synergies: existing organisations of marine stakeholders

Given the importance and scale of the task to develop a coherent marine and maritime research policy, it is clear that no single Member State or institution can mobilise the resources and expertise necessary to address the challenges and opportunities ahead. It is widely agreed that adopting a partnership approach will be necessary to address these challenges and opportunities. As recommended by the Aberdeen 2007 Declaration, this partnership must involve all the stakeholders: the European Commission, the Member States, the research funding agencies, marine and maritime representatives, inter-governmental organisations and networks, the European marine science community, maritime industries, local government and specialist NGOs. The diverse perspectives of these stakeholders must be harnessed in an holistic, creative and flexible manner through dialogue and sustained action.

Willing and constructive interactions are extant between existing nodes of expertise involved in research, monitoring, infrastructure management, and policy development, whether through pan-European inter-agency networks (e.g. EFARO, EuroGOOS, Marine Board etc.) or inter-governmental organisations (e.g. ICES, CIESM). The challenge for these organisations is to expand the scale of their activities to ensure sustained and long-term action in order to cope with and support the European political integration in marine

Figure 15. Peter Heffernan (MI, Ireland), Joe Borg (Commissioner for Fisheries and Maritime Affairs), Lars Horn (Marine Board Chair), Peter Herzig (KDM, Germany) at EurOCEAN 2007

and maritime science and technology, including particularly the development of the marine component of the European Research Area. These organisations have a collective responsibility to work together, combining the resources, facilities and expertise of their Member Organisations, towards informing strategy and shaping evidenced-based policy for future generations.

The inherent complementary nature of these organisations should be further harnessed to provide Europe with knowledge-based inter-disciplinary advice. **Building the marine component of the ERA should be elaborated on the basis of strengthening and making more effective the partnerships between existing organisations, rather than necessarily creating new ones**. Providing a flexible and reactive platform for enhanced partnerships would promote the timely delivery of consolidated strategic advice to the Commission Services, reducing fragmentation and duplication, resulting in synergy and added value, while supporting subsidiarity and avoiding risks associated with centralisation. **Mechanisms to increase dialogue between the Commission Services and external nodes of advice (for example, via a network of networks) should be elaborated**.

Developing a platform for enhanced partnership may require adaptation of institutional structures and methods of collaboration, for example through the establishment of a common point of interaction for secretariats of pan-European organisations. In this context it is noteworthy that the Secretariats of the Marine Board and EFARO will co-locate at new offices, in Ostend, from autumn 2007.

4. Sharing knowledge

Research Links: with policy makers and industry – securing uptake and impact

Outputs from the marine research community should be more readily available for use by policy makers. An effective channel for focused dialogue and knowledge-sharing between scientists and policy makers (turning data into information and knowledge), is necessary to ensure impact, uptake and enhanced use of scientific results, thus accelerating exploitation of research towards development of new products and services, and advancing knowledge for improved governance and societal benefit.

Increased interactions between the publicly funded research community and industrial research are necessary, both with maritime industries and with technology industries, in support of science and innovation. It will be necessary to identify and establish appropriate knowledge and technology exchange mechanisms to strengthen the links between research and industry. Private companies should be mobilised to access instruments/schemes in FP7 (e.g. European Technology Platforms). The establishment of knowledge transfer networks, to facilitate two-way flow (knowledge and expectations) between academia, industry and government agencies may be once such mechanism.

A partnership platform, as elaborated in item 3 above, should activate key events, such as an annual conference on marine science and technology, including maritime affairs, to identify the emerging research needs, and support interdisciplinary interaction between the research community, industry and policy makers. The resultant enhanced partnership between industry and public funding agencies should ensure elaboration of research efforts beyond the traditional academic focus, as well as enhanced synergy between the development of Member States' research programmes and Community funded programmes. **The partnership platform should foster knowledge and technology transfer, and the development of an in-house research and innovation capability in Europe.** The platform would also facilitate interactions with the European Commission Services and other organs of the European Union, national governments, industry, etc.

Such enhanced partnerships and synergies will be necessary to identify and prioritise the scientific challenges and opportunities, in both basic and applied research, including multi-disciplinary and inter-disciplinary approach, and embracing engineering, legal, social and economic aspects. It will be necessary to develop **marine and maritime foresight mechanisms** to regularly review new developments in emerging science and technology, their implications, and the opportunities offered, and to identify major drivers and lead markets. These priorities should inform both Community (Framework Programme) and Member State marine research funding programmes, and be the basis for joint EU-Member State Programmes (e.g. ERA-NET+, Article 169 schemes), further detailed below.

5. Optimising research programmes and priorities

Enhanced Interaction and Partnerships between Member State programmes and Community funding

In recognition of the needs and expectations of the European Research Area, and working towards coherence between national and regional programmes and research priorities of European relevance, it is increasingly important to develop a partnership approach to programmes funded by FP7 and those funded at

Figure 16. Communicating European Research 2005

national level (particularly since national funding is estimated to represent approximately 90% of available research funds). To this end, the optimal use of instruments such as ERA-NETs (including ERA-NET+), Technology Platforms and Article 169 is essential. It is incumbent on Member State and Community research policy makers to maximise the use of available instruments, and to create new instruments where necessary, working towards reduced fragmentation (while retaining diversity) and enhanced coherence and synergy between initiatives. As agreed at the EurOCEAN 2007 conference, the prize will be the realisation of a dynamic maritime economy, the sustainable governance and development of ocean resources, and the maintenance of Europe's historical leadership in global marine research and technology.

Providing a framework to build on existing opportunities delivered through ERA-NETs, Technology Platforms and other instruments, to further Community and Member State funding and co-operation in support of cross-sectoral and multinational research and partnerships will be essential to address key challenges at global, regional, national and local scales.

Enhanced use of ERA-NETs and European Technology Platforms (schemes) should include:

- **Necessary mechanisms towards enhancing the dialogue and collaboration between marine-related ERA-NETs, facilitated by the Commission Services**, towards ensuring that strategies are targeted directly, and improving cohesion between national scheduling of budgets and programmes;
- **Increased dialogue with the European Technology Platforms and stakeholder groups to facilitate greater awareness of the needs of industry**;
- Both schemes (ERA-NETs and Technology Platforms) should work together in contributing to the proposed marine research strategy. **Mechanisms should be elaborated to ensure cohesion between research strategies and programmes elaborated by ERA-NETs and European Technology Platforms, and those elaborated by Commission Framework Programmes and national funding programmes**.

The Marine Board emphasises that the cross-cutting prioritisation secured for marine science and technology throughout the themes in FP7 will require development of effective operational mechanisms for implementation. Crosscutting initiatives will rely heavily on external advice to ensure that topics addressed are relevant and targeted at improved capacity building, emphasising the importance of partnerships between nodes of external advice. **Mechanisms such as those discussed at the Seminar on Marine Sciences and Technologies in FP7 (Brussels, 16 January 2007), to improve dialogue between the Commission Services, FP7 Expert Advisory Groups and the Member State representatives on the FP7 Programme Committees, should be actively pursued.**

The Marine Board supports the development of integrated cross-Directorate initiatives linking sectoral policies (e.g. fisheries and aquaculture, renewable energy, transport, space etc.), research and enterprise policies and the environment policies to support an holistic and coherent approach when addressing marine and maritime issues on the global, regional, national and local scales. It will be necessary to monitor the effectiveness of cross-cutting initiatives, through regular review assessments and annual audits of marine research across all FP7 Themes (10) and Specific Programmes (4) (as well as JRC), and adapt future calls, where necessary.

6. Opening ERA to the world

Marine science addresses global challenges of interest to both coastal and non-coastal states, to both EU Member States and other countries. The ERA Green Paper's observation that "science has no boundaries" is particularly relevant in the context of marine science, where national boundaries cannot delineate or limit research activities.

Marine science will contribute significantly to Europe's response to one of the greatest challenges currently facing mankind – that of global climate change. An appropriate response to global climate change can only be achieved through a partnership focussed on prediction and scenario modelling, and the development of appropriate adaptive strategies at global, European, regional, national and local levels.

Actively fostering research collaborations between coastal states, and in particular with neighbouring states with which Europe shares regional seas, is a

priority. **Regional Seas (e.g. Mediterranean Seas, Black Sea) offer a ground for elaborating international cooperation in science and technology with neighbouring countries**. Cooperation with non-EU member states, particularly developing countries, must be a key activity rather than peripheral to the development of an integrated European Maritime Policy and the European Research Area. Europe should provide expertise on sustainability issues and support capacity building in developing countries (e.g. in coastal zone management, ocean observation, management of fisheries resources), in particular where European Union Member States are actively involved in resource exploitation (e.g. European Union fishing vessels working off third country coasts). Within this context, the identification and establishment of Marine Protected Areas (MPAs) in developing countries should also be supported by Europe, as should partnerships to develop training programmes and research. The European Union and its Member States must also develop sufficient programmes and incentives to promote and encourage technology transfer mechanisms to these countries.

The role of research in support of policy is particularly important in the marine and maritime fields. **The Marine Board supports the delivery of effective governance of the global marine environment, by engaging scientists, policy makers and the public to enable shared understanding and informed decision-making based on sound scientific knowledge. In support of the above, the development of a policy framework for active engagement of European scientists in the global context, at both research and policy level will be necessary**.

Annex I

Aberdeen Declaration (June 2007)

Annex I

The ABERDEEN DECLARATION

A New Deal for Marine and Maritime Science

EurOCEAN 2007

The European Marine and Maritime Science and Technology Community:

Recognising the great importance of the oceans and seas for Europe's economic, social and environmental development, and in particular the major challenges posed by global environmental change and the significant opportunities offered by the global market economy:

- Welcomes and **supports the European Commission's proposal for an all embracing European Maritime Policy** furthering the knowledge economy (Lisbon 2000), and laying the foundation for a marine and maritime component of the European Research Area (ERA).
- Is reassured that the proposed European Maritime Policy is **based on the principle of sustainable development** (Gothenburg 2001), and considers that the Thematic Strategy for the Marine Environment, as the environmental pillar of the maritime policy, should include a clear definition of regional targets and indicators that will deliver Good Environmental Status based on the best scientific understanding.

Calls for urgent action by the European Commission and the Member States to **further develop and enhance a partnership with the appropriate stakeholders** to:

1. **Initiate in 2008** a comprehensive and **integrated European Marine and Maritime Science, Research, Technology and Innovation Strategy.**
2. **Establish an adequately resourced and sustained process** to oversee the implementation and delivery of this Strategy within an holistic European Maritime Policy.
3. **Initiate and support the necessary funding mechanisms**, specialised infrastructures, data collection and information management and capacity building essential to manage our on-going relationship with the oceans and seas.

The Research Strategy must enable:

- Foresight activities to identify new and emerging scientific challenges and opportunities.
- Cross-sectoral, multinational and interdisciplinary research partnerships.
- Co-operation between research, industry and other stakeholders to enhance knowledge and technology transfer and innovation.
- Development of scientific and technology capacity to strengthen the knowledge economy.
- Shared use, planning and investment of critical infrastructure on a Europe-wide basis.

Rationale: The above action will support the objectives of the proposed European Maritime Policy, **delivering significant added-value** in key areas:

- **Economic Development:** to increase Europe's share of the estimated €4,360 billion global maritime market economy through the development and up-take of innovative marine and environmental technologies.
- **Environmental Management:** to provide the knowledge and tools needed to implement European Union Directives and Regulations, International Conventions and Regional / National / Local Action Plans.
- **Ocean and Coastal Governance:** to enable the application of the principles of marine spatial planning and the ecosystem approach to resource management within the European Union with neighbouring states and globally to support effective governance of the marine and maritime environment.

In this context, **marine science will contribute significantly** to Europe's response to one of the greatest challenges currently facing mankind – that of **Global Climate Change**. An appropriate response to Global Climate Change can only be achieved through a partnership focused on:

- **Mitigation:** developing efficient **renewable ocean energy systems**, reducing CO_2, improving energy security and providing new business opportunities.
- **Adaptation: mobilising existing and establishing new ocean observatory and data collection systems** to better understand the pace and impact of climate change on the oceans and impacts on the wider earth system. This knowledge will improve prediction and scenario modelling and the **development of appropriate adaptive strategies** at European, regional, national and local levels to offset and cope with negative socio-economic impacts.

THE ABERDEEN DECLARATION (June 2007)

The ABERDEEN DECLARATION

A New Deal for Marine and Maritime Science

BACKGROUND

The EurOCEAN 2007 Conference (Aberdeen, Scotland, UK: 22nd June 2007), occurring as it did during the final period of a commendable public consultation process on the European Maritime Policy Green Paper, provided a unique opportunity for the European Marine and Maritime Science and Technology Community to respond to the Green Paper **"Towards a Future Maritime Policy for the Union: A European Vision for the Oceans and Seas".**

The Conference, attended by circa 200 representatives of the European Marine and Maritime Science and Technology Community, policy makers, representatives of Inter-Governmental Organisations and Non-Government Organisations (NGOs) and other key stakeholders from 16 European states, represented the culmination of an open and dynamic consultation process which has seen interested stakeholders across Europe coming together to formulate views and propose strategic initiatives regarding the role of science and technology in achieving the goals of the Maritime Policy.

> *"An all embracing maritime policy aimed at developing a dynamic maritime economy in harmony with the marine environment, supported by sound marine science and technology, which allows human beings to continue to reap the rich harvest from the oceans in a sustainable manner".*
>
> Towards a future Maritime Policy for the Union: A European Vision for the Seas and Oceans (2006)

Annex I

RATIONALE: ADDING VALUE - SCIENCE SUPPORTING POLICY

At the political and ocean governance level, the implementation of the **European Marine and Maritime Science, Research, Technology and Innovation Strategy** will, we believe, contribute significantly by adding value to policy development and implementation by providing the knowledge needed to aid evidence-based inter-linked policy in key areas such as:

- **Economic Development:** to increase Europe's share of the estimated €4,360 billion global maritime market economy through the development and up-take of innovative marine and environmental technologies (including eco-technologies) supporting, for example, marine biotechnology, new and renewable ocean energy systems, novel maritime and transportation approaches, innovative ocean observation systems and associated technologies, marine leisure and tourism as well as the substantial markets associated with the sustainable use of biological resources, including seafood production.
- **Environmental Management:** to better understand natural marine hazards, to measure and mitigate human impacts on the marine and coastal environment, to provide appropriate indicators of the quality and status of the marine environment and provide the knowledge and tools needed to implement the relevant European Union Directives, International Conventions and Regional / National / Local Action Plans, and deal with uncertainty.
- **Ocean and Coastal Governance:** to enable the application of the principles of marine spatial planning, incorporating Integrated Coastal Zone Management, risk assessment, and a precautionary and ecosystem approach to resource management within the European Union and with neighbouring states (for example in the Mediterranean and Black Sea basins) and globally to support effective governance of the marine and maritime environment.

In this context, **marine science will also contribute significantly** to Europe's response to one of the greatest challenges currently facing mankind – that of **Global Climate Change**. An appropriate response to Global Climate Change can only be achieved through a partnership focused on:

- **Mitigation:** developing efficient renewable ocean energy systems which in addition to reducing CO_2 and improving energy security, represent new business opportunities.
- **Adaptation by mobilising existing and establishing new ocean observatory and data collection systems** to better understand the pace and impact of climate change on the oceans (e.g. sea-level rise, biodiversity and ecosystem services, biogeographic species shifts, ocean acidification) and the impacts on the wider earth system. This knowledge will enable better prediction and scenario modelling and the **development of appropriate adaptive strategies** and relevant innovative interventions at European regional, national and local levels to offset and cope with negative socio-economic impacts.

THE ABERDEEN DECLARATION (June 2007)

A EUROPEAN MARINE AND MARITIME SCIENCE, RESEARCH, TECHNOLOGY AND INNOVATION STRATEGY

An integrated Maritime Policy needs a comprehensive and supportive Marine and Maritime Science, Research, Technology and Innovation Strategy. The challenge for the European Commission, the Member States and the European Marine and Maritime Science and Technology Community is to support the preparation of this comprehensive and integrated Research Strategy which will identify short- and long-term priorities and incorporate the following components:

- Identify and prioritise the **scientific challenges and opportunities**, in terms of both **basic and applied research** including a **multi-disciplinary and inter-disciplinary approach**, and embracing **engineering, legal and social and economic sciences**, to support a dynamic maritime economy. These priorities should inform both Community (e.g. FP7) and Member State Marine Research Funding Programmes, and be the basis for joint EU-Member State Programmes (e.g. ERA-NET+, Article 169 schemes).
- Support the development of **integrated cross-Directorate initiatives linking sectoral policies** (fisheries and aquaculture, renewable energy, transport, space, etc.) **research and enterprise policies and the environment** to support an holistic and coherent approach when addressing marine and maritime issues on the global, regional, national and local scales.
- Provide a framework, building, for example, on ERA-NETs, Technology Platforms and other European Union instruments, to **further Community and Member State funding and co-operation** in support of cross-sectoral and multinational research projects and partnerships to address key challenges at global, regional, national and local scales.
- Identify and establish appropriate knowledge and technology exchange mechanisms to **strengthen the links between research and industry** turning knowledge (the product of research) into value added products and services and creating income and jobs. It must **foster knowledge and technology transfer** and the development of an in-house research and innovation capability in indigenous European maritime industries through the establishment and resourcing of appropriate support mechanisms.
- Include a **Marine and Maritime Foresight** mechanism to regularly review new developments in emerging science and technology, their implications and the opportunities offered, and to identify the major drivers and lead markets.
- Actively foster **relationships with coastal states** and in particular with neighbouring states with whom Europe shares regional seas, e.g. the Black Sea and the Mediterranean Sea.
- Formulate a **policy framework** for active **engagement of European scientists in the global context**.
- **Identify the specialised pan-European research infrastructures** (e.g. specialised research vessels, sub sea technologies, satellite and in-situ ocean observing systems, sustained monitoring and data collection facilities, databases and information portals, high performance computing, modelling and land based facilities) required to meet identified challenges and opportunities and seek to **maximise the shared use and efficiency of Europe's research infrastructures**, including those proposed under the current European Strategy Forum on Research Infrastructures (ESFRI) Roadmap and Integrated Infrastructure Initiatives (I3).
- **Promote human capacity building**, and the related issues of attractive research careers and researcher mobility, to ensure that appropriate highly-skilled researchers and support personnel are available to underpin economic and environmental developments in the marine and maritime sector.
- Address the concerns of young researchers and support the inclusion of marine modules in the educational system at all levels, including life-long learning.
- Support the **delivery of effective governance** of the marine environment, engaging scientists, policy makers and the public to enable shared understanding and informed decision-making based on sound scientific knowledge.

THE ABERDEEN DECLARATION (June 2007)

Annex I

THE NEXT STEPS

Preparing the Research Strategy

1. The preparation of the European Marine and Maritime Science, Research, Technology and Innovation Strategy will **require a consultative process to bring the key stakeholders together to develop the Strategy**.

Implementing the Research Strategy

2. Implementation and delivery of the Research Strategy will require an **adequately resourced and permanent mechanism**. Whether this should be a Secretariat, a Network of Networks or some other structure is a matter for further debate and analysis and will depend on the scope and focus of the Strategy agreed. What it must do, however, is embrace diversity, reduce fragmentation and build on the achievements of the various existing sectoral and regional marine and maritime research and technology organisations and networks.

Irrespective of the detail of the resultant Research Strategy, the EurOCEAN 2007 Conference recognises a requirement for essential actions to assist the creation of the marine and maritime component of the ERA. These include:

3. The implementation of the recommendations from the **Seminar on Marine Sciences and Technologies in FP7**[1] (Brussels, 16th January 2007) on the establishment of an appropriate implementation and monitoring mechanism to fully realise the enhanced status of marine science and technology as a priority cross-cutting theme in the EU's 7th Framework Programme (2007 – 2013).
4. Advancing cooperation between the Research and Technology Programmes of the European Union and the Member States, particularly within the context of the ERA-NET Scheme.
5. The establishment and resourcing of a **European Marine Observation and Data Network (EMODN)**[2] is essential to managing our on-going relationship with the oceans and seas. This action would see the establishment of permanent, sustained monitoring and observation structures, networks and the underpinning data provision, curation, information management and dissemination needed to support good ocean governance (including risk assessment, modelling and prediction), good science, a better understanding of ocean dynamics (including climate change and geodynamics), improved resource utilisation and the protection of the marine environment. Such data collection and management infrastructures and regimes must be harmonised and their long-term viability (funding) ensured by the European Commission and the Member States.
6. The preparation of a 4-D digital **European Atlas of the Seas**, which we see as a highly desirable, high level and high profile initiative for marine and coastal spatial planning, business and nature conservation purposes, as an educational and promotional tool and as a mechanism for outreach to reinforce public awareness of our shared maritime heritage.
7. Support for other key infrastructures, including, for example, high performance computing, modelling and prediction capabilities, satellite and in-situ ocean observing systems, real-time seabed and water column observatories, moorings, platforms and research fleets which, because of their size and complexity, can only be operated and sustained on a partnership basis.
8. Support for a **regular (annual) European Marine Science and Technology Conference**.

1. Seminar Information http://ec.europa.eu/research/conferences/index_en.cfm
2. European Marine Observation and Data Network (EMODN) Background Paper No. 4a of the Maritime Green Paper Consultation Process. SEC(2006)689.

THE ABERDEEN DECLARATION (June 2007)

A PARTNERSHIP APPROACH

Given the importance and immensity of the task at hand, it is clear that no single country or institution can mobilise the resources and expertise needed to address the challenges and opportunities ahead. The EurOCEAN 2007 Conference agreed that a **Partnership Approach** is the only way to address these challenges and opportunities. This partnership must involve all the stakeholders: the European Commission, the Member States, the Research Funding Agencies, Marine and Maritime Representative Inter-Governmental Organisations and Networks, the European Marine Science Community, Maritime Industries, Local Government, and specialist NGOs. The diverse perspectives of these various stakeholder groups must be brought together in an holistic, creative and flexible way through dialogue and sustained action.

The prize will be to realise the aim of achieving a dynamic maritime economy, the sustainable governance and development of ocean resources and to build on the strengths which have historically underpinned Europe's maritime leadership and will continue to do so into the future.

> *"Only excellence in marine research and technology would allow us to deliver the goal of a thriving maritime economy and the realisation of the full potential of sea-based activities in an environmentally sustainable manner".*
>
> - Joe Borg, EU Commissioner for Fisheries and Maritime Affairs, EurOCEAN 2007. June 2007.

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Annex I

THE EUROCEAN 2007 CONFERENCE ORGANISING COMMITTEE
&
THE ABERDEEN DECLARATION

The EurOCEAN 2007 Conference (Aberdeen, 2007) is a successor to the MAST DAYS / EurOCEAN Conference Series held in Brussels (1994), Sorrento (1996), Lisbon (1998), Hamburg (2000) and Galway (2004).

EurOCEAN 2007 provided a major opportunity for the European marine science and technology community to contribute to the debate on a future maritime policy for the European Union and to formulate a maritime vision in response to the Maritime Policy Green Paper. The EurOCEAN 2007 Conference was held in the Aberdeen Exhibition and Conference Centre (AECC), Aberdeen, Scotland on Friday 22nd June 2007.

The **EurOCEAN 2007 Conference and the drafting of the Aberdeen Declaration** was co-ordinated by a Committee representing a number of leading European and Regional Marine Science and Technology Consortia, Networks and Institutions including: intergovernmental organisations such as the International Council for the Exploration of the Seas (ICES) and the Commission Internationale pour l'Exploration Scientifique de la Mer Méditerranée (CIESM); pan-European Networks such as the Marine Board-ESF, the European Fisheries and Aquaculture Research Organisation (EFARO), the European Global Ocean Observing System (EuroGOOS), the European Consortium for Ocean Research Drilling (ECORD); National Networks such as Konsortium Deutsche Meeresforschung (KDM) and the Scottish Association for Marine Science (SAMS); industry networks such as the Waterborne Technology Platform, European Aquaculture Society (EAS) and the International Association of Oil and Gas Producers (OGP) and a number of national marine research institutes (Ifremer, NOC, NERC, MI). A representative of the IEEE/OES OCEANS '07 Conference Organising Committee was also involved. The Marine Board-ESF provided the Secretariat to the Organising Committee.

The EurOCEAN 2007 Conference was timed to follow the IEEE/OES OCEANS '07 Conference which was held at the same venue in Aberdeen from 18th – 21st June 2007.

The Aberdeen 2007 Declaration is focused on the development of the European Maritime Policy. It builds on and up-dates the **Galway Declaration (EurOCEAN 2004)** which had a major influence on EU and National Funding Programmes for Marine and Maritime Research Programmes and Strategies. The Declaration also draws on the **Seminar on Marine Sciences and Technologies in FP7** (Brussels, 16th January 2007), the **Germany EU Presidency Conference: Towards a Future Maritime Policy for the Union** (Bremen, 2 – 4th May 2007) and on the written submissions to the Maritime Green Paper Consultative Process made by the various groups participating in the organisation of EurOCEAN 2007.

In this way the Conference, and resultant Aberdeen Declaration approved during the EurOCEAN 2007 Conference, received input and endorsement from a multitude of European Marine Research Organisations, Networks and individual scientists.

web address: http://ec.europa.eu/maritimeaffairs/eurocean2007.html

THE ABERDEEN DECLARATION (June 2007)

The EurOCEAN 2007 Conference was sponsored by the European Commission

Annex II

European Commission's Blue Book List of priorities (October 2007)

Annex II

1. Applying the Integrated Approach to Maritime Governance

The Commission will:
- invite Member States to draw up national integrated maritime policies, working closely with stakeholders, in particular the coastal regions;
- propose in 2008 a set of guidelines for these national integrated maritime policies and report annually on EU and Member States' actions in this regard from 2009;
- organise a stakeholder consultation structure, feeding into further development of the Maritime Policy and allowing exchange of best practices.

2. Tools for Integrated policy-making

A European network for maritime surveillance
The Commission will:
- promote improved cooperation between Member States' Coastguards and appropriate agencies;
- take steps towards a more interoperable surveillance system to bring together existing monitoring and tracking systems used for maritime safety and security, protection of the marine environment, fisheries control, control of external borders and other law enforcement activities.

Maritime Spatial Planning and Integrated Coastal Zone Management (ICZM)
The Commission will:
- develop a roadmap in 2008 to facilitate the development of maritime spatial planning by Member States.

Data and Information
The Commission will:
- take steps in 2008 towards a European Marine Observation and Data Network, and promote the multi-dimensional mapping of Member States' waters, in order to improve access to high quality data.

3. Maximising the Sustainable Use of the Oceans and Seas

The Commission will:
- propose a new ports policy, taking account of the multiple roles of ports and the wider context of European logistics;
- make proposals to reduce the levels of air pollution from ships in ports, namely by removing tax disadvantages for shore side electricity;
- issue guidelines on the application of the relevant Community environmental legislation to port development,
- encourage the formation of multi-sectoral clusters and regional centres of maritime excellence, and promote a European network of maritime clusters.
- reassess, in close cooperation with social partners, the exclusions affecting maritime sectors in EU labour legislation;
- promote a Certificate of Maritime Excellence.
- launch pilot actions to reduce the impact of and adapt to climate change in coastal zones;
- support actively international efforts to diminish air pollution caused by ships and make proposals at European level in the absence of progress in such efforts;
- support actively international efforts to diminish greenhouse gas emissions from ships, and, in the absence of progress in such efforts, consider possible options for EU measures in this regard;
- taking duly into account the ongoing work at international level, make proposals for dismantling obsolete ships in an efficient, safe and environmentally sustainable manner;
- take firm action towards the elimination of discards and of destructive fishing practices such as high seas bottom trawling in sensitive habitats;
- take firm action to eliminate Illegal, Unreported and Unregulated fisheries;
- promote the development of an environmentally safe aquaculture industry in Europe.

4. Building a Knowledge and Innovation Base for the Maritime Policy

The Commission will:
- present a comprehensive European Strategy for Marine and Maritime Research in 2008;
- launch joint cross-cutting calls under the 7th Research Framework Programme to promote an integrated approach and improve understanding of maritime affairs;
- support research to predict, mitigate and adapt to the effects of climate change on maritime activities, the marine environment, coastal zones and islands;
- support the creation of a European marine science partnership for a concerted dialogue between the scientific community, the industry and policy makers.

5. Delivering the Highest Quality of Life in Coastal Regions

The Commission will:
- promote, within the forthcoming tourism initiative, coastal and maritime tourism;
- prepare a data-base on Community funding available for maritime projects and coastal regions, and will develop by 2009 a database on socioeconomic data for maritime sectors and coastal regions;
- propose a Community Disaster Prevention Strategy highlighting the risks to which coastal regions are exposed;
- promote the development of the maritime potential of Outermost regions and islands.

6. Promoting Europe's Leadership in International Maritime Affairs

The Commission will:
- promote cooperation under the Enlargement and European Neighbourhood Policies, and the Northern Dimension to cover Maritime Policy issues and management of shared seas;
- propose a strategy for the external projection of the Union's Maritime Policy through a structured dialogue with major partners.

7. Raising the Visibility of Maritime Europe

The Commission will:
- launch a European Atlas of the Seas as an educational tool and as a means of highlighting our common maritime heritage;
- propose the celebration of an annual European Maritime Day as from 2008, raising the visibility of maritime affairs and promoting links between maritime heritage organisations, museums and aquaria.

Annex III

List of Acronyms

Annex III

Argo	Global Array of Profiling Floats
AUV	Autonomous Underwater Vehicle
BOOS	Baltic Ocean Observing System
BPNS	Belgian Part of the North Sea
CESA	Community of European Shipyards' Associations
CIESM	Conseil International pour l'Exploration Scientifique de la Méditerranée
COST	European Cooperation in the field of Scientific and Technical Research
DG	Directorate General
EC	European Commission
EEIG	European Economic Interest Grouping
EFARO	European Fisheries and Aquaculture Research Organisations
EIT	European Institute of Technology
EMODN	European Marine Observation and Data Network
EMSO	European Multi-disciplinary Seafloor Observatory
ENTR	DG Enterprise (European Commission)
ENV	DG Environment (European Commission)
EP	European Parliament
ERA	European Research Area
ERA-NET	European Research Area Network
ERC	European Research Council
ERVO	European Research Vessel Operators forum
ESF	European Science Foundation
ESFRI	European Strategy Forum on Research Infrastructures
EU	European Union
Euro-Argo	European Global Array of Profiling Floats
EurOCEAN 2004	Irish EU Presidency Event (10th-13th May 2004)
EUROCORES	EUROpean COllaborative RESearch
EuroGOOS	European Global Ocean Observing Systems
EUROHORCs	European Heads of Research Councils
FMA	DG Fisheries and Maritime Affairs (European Commission)
FP	Framework Programme
GEOSS	Global Earth Observations System of Systems
GMES	Global Monitoring for Environment and Security
GOOS	Global Ocean Observing System
HELCOM	Helsinki Commission
I3	Integrated Infrastructure Initiative
ICES	International Council for the Exploration of the Sea
ICZM	Integrated Coastal Zone Management
IOC	International Oceanographic Commission
IODP	Integrated Ocean Drilling Program
JRC	Joint Research Centre
KDM	Konsortium Deutsche Meeresforschung
MB-ESF	Marine Board – European Science Foundation
MI	Marine Institute – Ireland
MPA	Marine Protected Area
MSP	Marine Spatial Planning
NoE	Network of Excellence
NGO	Non-Governmental Organisation
NIOZ	Netherlands Institute for Sea Research
OFEG	Ocean Fleets Exchange Group
OGP	International Association for Oil and Gas Producers
OSPAR	Oslo Paris International Convention
POGO	Partnerships for the Observation of the Global Oceans
ROV	Remotely Operated Vehicle
RV	Research Vessel
R&D	Research and Development
RTD	DG Research and Technological Development (European Commission)
TP	Technology Platform
TREN	DG Transport (European Commission)

Annex IV

Marine Board–ESF Member Organisations

Annex IV

Belgium
- Fonds National de la Recherche Scientifique (FNRS)
  National Fund for Scientific Research
- Fonds voor Wetenschappelijk Onderzoek – Vlaanderen (FWO)
  Research Foundation Flanders

Denmark
- Forskningsrådet for Natur og Univers (FNU)
  Natural Science Research Council

Finland
- Suomen Akatemia / Finlands Akademi
  Academy of Finland

France
- Centre National de la Recherche Scientifique (CNRS)
  National Centre for Scientific Research
- Institut Francais de Recherche pour l'Exploitation de la Mer (Ifremer)
  French Sea Research Institute

Germany
- Deutsche Forschungsgemeinschaft (DFG)
  German Research Foundation
- Hermann-von-Helmholtz-Gemeinschaft deutscher Forschungszentren (HGF)
  Association of National Research Centres

Greece
- Hellenic Centre for Marine Research (HCMR)

Ireland
- Marine Institute

Italy
- Consiglio Nazionale delle Ricerche (CNR)
  National Research Council
- Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS)
  National Institute of Oceanography and Experimental Geophysics

The Netherlands
- Koninklijke Nederlandse Akademie van Wetenschappen (KNAW)
  Royal Netherlands Academy of Arts and Sciences
- Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NWO)
  Netherlands Organisation for Scientific Research

Norway
- Havforskningsinstituttet
  Institute of Marine Research
- Norges Forskningsrådet
  The Research Council of Norway

Poland
- Polska Akademia Nauk (PAN)
  Polish Academy of Sciences

Portugal
- Fundação para a Ciência e a Tecnologia (FCT)
  Foundation for Science and Technology

Spain
- Consejo Superior de Investigaciones Científicas (CSIC)
  Council for Scientific Research
- Instituto Espanol de Oceanografia (IEO)
  Spanish Institute of Oceanography

Sweden
- Vetenskapsrådet
  Swedish Research Council

Turkey
- Türkiye Bilimsel ve Teknolojik Arastirma Kurumu (TÜBITAK)
  The Scientific and Technological Research Council of Turkey

United Kingdom
- Natural Environment Research Council (NERC)
- National Oceanography Centre, Southampton (NOCS)

Marine Board–ESF Associated Members

Cyprus
- Cyprus Oceanography Center

Estonia
- Eesti Teaduste Akadeemia
  Estonian Academy of Sciences

Malta
- Malta Council for Science and Technology (MCST)

Romania
- Consiliul National al Cercetarii Stiintifice din Invatamantul Superior
  National University Research Council (NURC)

European Science Foundation

The European Science Foundation (ESF) was established in 1974 to create a common European platform for cross-border cooperation in all aspects of scientific research.

With its emphasis on a multidisciplinary and pan-European approach, the Foundation provides the leadership necessary to open new frontiers in European science.

Its activities include providing science policy advice (Science Strategy); stimulating co-operation between researchers and organisations to explore new directions (Science Synergy); and the administration of externally funded programmes (Science Management). These take place in the following areas: Physical and engineering sciences; Medical sciences; Life, earth and environmental sciences; Humanities; Social sciences; Polar; Marine; Space; Radio astronomy frequencies; Nuclear physics.

Headquartered in Strasbourg with offices in Brussels, the ESF's membership comprises 75 national funding agencies, research performing agencies and academies from 30 European countries.

The Foundation's independence allows the ESF to objectively represent the priorities of all these members.

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Marine Board–ESF Member Organisations

Marine Board–ESF Associated Members

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SETTING SCIENCE AGENDAS FOR EUROPE

MARINE BOARD

Wandelaarkaai 7
B – 8400 Ostend
Belgium
www.esf.org/marineboard

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