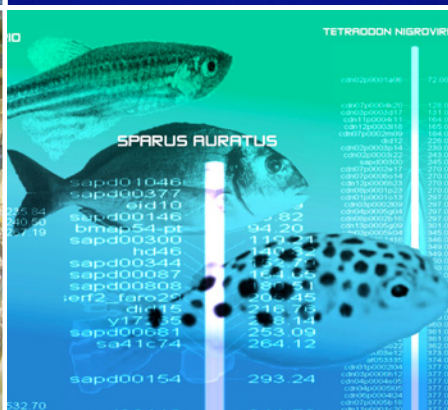


EMBRC
EUROPEAN
MARINE
BIOLOGICAL
RESOURCE
CENTRE

EMBRC Business Plan



EMBRC Business Plan

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Purpose of Document

This document is intended for stakeholders, national research funding agencies, business and industry as well as NGOs and policy makers concerned with marine (bio-) resources, biotechnology, as well as basic and applied scientific research.

It describes the organisation, governance and financial plans for the European Marine Biological Resource Centre (EMBRC) and defines the added value that this Research Infrastructure will bring to Europe 2020 and beyond.

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Table of Contents

Executive summary	5
1. Introduction	6
1.1. What is EMBRC?	6
1.2. European marine stations need European-scale organisation	6
1.3. The need for global positioning	9
2. Impact	11
2.1. Scientific research	11
2.2. European research programming initiatives	11
2.3. Socio-economic impact	12
2.4. Impact on industrial users	13
3. The Mechanisms	15
3.1. EMBRC's legal form and governance	15
3.1.1. Legal form	15
3.1.2. Governance	15
3.1.3. Next steps towards implementation	17
3.2. Infrastructure	19
3.2.1. Existing infrastructure	19
3.2.2. Planned infrastructure	21
3.2.3. Review, update and discontinuation of RI elements	22
3.3. EMBRC-ERIC activities	22
3.3.1. Management, promotion and marketing	22
3.3.2. Joint development activities	22
3.3.3. Knowledge transfer to industry and policy makers	23
3.3.4. Access clearance to marine biodiversity	23
3.3.5. Education and training	24
3.3.6. Collaborations and interoperability with sister RIs, JPIs and ERA-NETs	25
3.3.7. Audit, risk management and quality assurance	25
4. Financial Plans	27
4.1. Capital requirements – Future infrastructure investments	27
4.2. Revenue requirements	27
4.2.1. The implementation phase	27
4.2.2. The operational phase	28

5. Timeline.....	31
Abbreviations.....	32
Glossary.....	34
References.....	35
Acknowledgement.....	36
Annexes.....	37
1. EMBRC Partners.....	37
2. Associate and Aspiring Partners.....	38
3. Criteria to join EMBRC.....	39
4. Governance: Duties and tasks.....	40
5. Financial plans: Breakdown of capital investment.....	42

Executive summary

Our seas and oceans control the Earth's climate and provide a rich and largely unexplored reservoir of biodiversity with great potential to contribute to food and energy security, human health and industrial production. Acquiring sufficient understanding of marine ecosystems to allow the sustainable exploitation of marine biological resources will require a step change in scientific endeavour. In order to secure Europe's global competitiveness and address Europe's grand challenges related to energy, food, job security, human health, climate change and on-going environmental degradation, it is now necessary to mobilise and link the currently fragmented infrastructure and human resources in Europe. To help meet these challenges, the European Marine Biological Resource Centre (EMBRC) was established to provide a strategic delivery mechanism for the provision of large scale and high quality marine science in Europe. EMBRC will become the major provider of marine biological research infrastructure and related services in Europe and provide a single access point to a comprehensive range of European marine coastal ecosystems and biological resources.

EMBRC is currently in the preparatory phase with the implementation phase launching in February 2014. EMBRC operation is planned from 2016 as a European Research Infrastructure Consortium (ERIC). EMBRC-ERIC will have a European-level centralised management (central hub) and a distributed operation with state-of-the-art facilities and services provided at EMBRC nodes located at leading marine stations and research centres across Europe. The central organisation will allow the strategic provision of marine research infrastructure through a single access portal. EMBRC-ERIC will be governed through statutes and service-level agreements with the national operators of the marine stations and research centres.

With a dedicated promotion and marketing strategy, EMBRC will attract users from across the life sciences including biological disciplines, environmental and conservation sciences, biotechnology and biomedicine as well as from industry and the technology sector. By bringing users from these various communities together, EMBRC will enhance interdisciplinary bridges and facilitate novel, innovative collaborations between public and private sectors. EMBRC will work towards interoperability of protocols, continuous updating of methodologies, technological synergy and complementarity of platforms, common training and shared planning of future large-scale investments in

buildings, capital equipment, and human resources. Joint development activities will continuously improve the existing services as well as enable the development of new services adjusted to the scientific and biotechnological research priorities of academic, governmental and industrial users and in response to emerging societal challenges. EMBRC will provide the environment, facilities and expertise for the education and training of students and professionals in the life sciences. In particular, EMBRC will be central in the development of blue biotechnologies providing new opportunities for bioprospecting, bioremediation, sustainable aquaculture and fisheries using gene, protein and other molecular-based techniques. A socio-economic impact study carried out during the preparatory phase calculated an Economic Net Present Value (ENPV) for EMBRC of over M€300 during its lifetime, demonstrating a clear societal benefit and contribution to several dimensions of regional, national and European development.

Funding of EMBRC will come from multiple funding streams including membership fees, national and European public sources and gradually increasing income from service delivery and access fees during the operational phase. EMBRC access fees will be based on full economic cost for users from the public sector and commercial rates for users from the private sector. The EMBRC central hub, responsible for the strategic leadership, management and administration of the Research Infrastructure, will be financed via annual subscription fees from the EMBRC member states. In the implementation phase, costs are primarily related to staff costs of the central hub and estimated at M€1.1 for 2014-2016. Value-added service activities are expected to increase in the operational phase and funding of EMBRC-ERIC during the first three years of operation is estimated at M€19.4. The national operators will themselves be responsible for maintenance and development of their infrastructure under EMBRC-ERIC access through national budgets. In return, EMBRC-ERIC is expected to significantly increase the visibility and attractiveness of the national infrastructures where the nodes are located and bring new users, which will open up opportunities for fruitful collaborations. EMBRC-ERIC will have a positive impact on the regional development in all member states and will enhance the strategic relevance and leverage of the national infrastructures/nodes in the regional, national and European context.

I. Introduction

I.1. What is EMBRC?

The European Marine Biological Resource Centre (EMBRC) is a distributed Research Infrastructure (RI) that will provide access to a comprehensive range of marine ecosystems and organisms of the coastal seas of Europe and become the major European provider of marine biological research infrastructure and related services. It will provide access to both the expertise and specialist facilities required for the sustainable exploitation of marine biological resources. EMBRC will have a leading role in the development of new model organisms (see Glossary) for the whole of the biological and biomedical research communities in both private and public sectors. Access to the RI will be provided at full economic cost and based on scientific merit and feasibility for academic users. Commercial rates will be charged for industrial users and access offered based on feasibility (see Chapter 4). EMBRC adopts a subsidiarity model, in which a centralised

organisation managed by a European-level central hub coordinates a distributed operation. The user services will be performed at the EMBRC nodes in multiple locations and different countries. In the current preparatory phase, EMBRC comprises nine Founding Partners and seven Associate Partners (Annexes 1-3).

I.2. European marine stations need European-scale organisation

Life in the oceans is ancient, over 3.5 billion years old, and is therefore unique in its extraordinary breadth of biological and chemical diversity. Marine organisms have evolved unique adaptations to survive in the manifold of complex marine ecosystems and environmental conditions, resulting in an immense diversity of biomaterials and bioactive compounds. These products are potentially significant for biological, biomedical and biotechnological research and its applications.



European coastal seagrass meadows are highly productive areas and biodiversity hotspots. © Observatoire Océanologique de Banyuls sur mer (CNRS/UPMC)

However, approximately 80% of all marine life in today's oceans remains unexplored.

Technological development is pushing back the frontiers of science and influences our science policy landscape. Today's tools for exploring all parts of marine environments range from 'omics to satellite observation. Advances in high throughput sequencing technologies including metagenomics are now allowing large-scale studies of marine ecosystems, providing an unprecedented, direct access to marine genes and gene products. These new approaches will also revolutionise the monitoring of marine ecosystems, many of which are under immediate threat of regional and global anthropogenic impacts. Biology is in the midst of a revolution driven by the development of new model species, new technologies and improvement of computational methods to analyse high volumes of data, promoting step-change advances in our understanding of biological systems. These recent advances will enable us to move much faster from discovery to application, provided that we mobilise the fragmented human and infrastructure resources currently available in Europe in a concerted and long-term effort. The potential benefits of pooling resources in Research Infrastructures including EMBRC are immense.

Marine and coastal areas support an enormous breadth of economic activities ranging from renewable energy generation, oil and gas extraction, aquaculture and fisheries to shipping, tourism and leisure pursuits, and are a major source of growth and employment. Marine species are key components in the sustainable development of this economy, an important food and feed resource as well as a rich source of biofuels and novel compounds for medicine and industry. Notably, the EU economy linked to blue biotechnologies (see Glossary) provides jobs to 5.4 million citizens and generates a gross added value of just under €500 billion per year.¹ The market for marine biotechnology products is forecast to reach a total of US\$4.1 billion by 2015 (see report by Global Industry Analysts, Inc.)². This is expected to then grow by approximately 10% yearly. Accessing marine biodiversity requires specialised research infrastructure, which is provided by coastal marine research stations and laboratories that are partners

of EMBRC. These partners provide access to a broad range of biological resources, including wild organisms as well as a number of emerging model species that are cultivated *ex situ*, together with sophisticated imaging and 'omics platforms for their analysis. The next 10-20 years will see a dramatic increase in the demand for access to relatively unexplored species in order to test their suitability for development as models for basic and applied research and industrial usage. EMBRC will be leading the provision of the services and platforms needed for the sustainable collection, investigation and establishment of these new models.

Traditionally, European marine stations and laboratories have operated independently, which is associated with inefficient utilisation of the existing infrastructure and uncoordinated planning of large-scale facilities at the European level. The current arrangement of marine research stations operating entirely independently also hinders research aimed at making connections between processes across regional seas and/or at different latitudes, a factor that is particularly important in the field of assessing climate change impacts. No single marine centre or member state can provide all of the state-of-the-art facilities needed to grasp the burgeoning opportunities in marine biological research. This awareness motivated the FP6 Integrated Infrastructure Initiative (I3) project ASSEMBLE, a network of eight leading coastal marine biological



Research Vessel *Neomysis*. © Wilfried Thomas, Station Biologique de Roscoff (CNRS/UPMC)

¹ Maritime Forum, Blue Growth Study.

² Marine Biotechnology - A Global Market Report.

research centres providing collective transnational access to a set of marine ecosystems and marine model organisms, including an increasing number of experimental systems amenable to state-of-the-art genomics approaches. ASSEMBLE began to connect a loose network of marine stations and laboratories in Europe and has provided a good starting point for the fully integrated Research Infrastructure for marine biology in Europe that EMBRC will become.

The added value of EMBRC at the European scale:

1. Strengthening the network and increasing the number of partners will significantly improve the infrastructure and services to fit user needs.
2. Long-term partnerships will enable advanced integration of marine biological research infrastructure in Europe as well as sophisticated joint development activities at the European scale.
3. High leverage to support EU's growth strategy until 2020 and beyond in all five ambitious objectives including employment, innovation, education, social inclusion and climate/energy.

Increasing the number of partners will result in a broader coverage of European marine ecosystems and biological resources (aiming at encompassing all European regional seas and associated breadth of marine biodiversity) and integration of high-level marine research platforms. This enhanced coverage of European coastal ecosystems and research infrastructure brought about by EMBRC will accelerate both the speed of discovery in life sciences and their applications, in this way promoting the bio-based blue economy. EMBRC will thus also facilitate areas of European environmental policy, including e.g. the refinement of marine ecosystem monitoring (cf. "genomics observatories" for the Marine Strategy Framework Directive).

EMBRC will enable long-term, sustainable partnerships, which are a prerequisite for efficient technological development. EMBRC will promote strategic planning of new marine research platforms in Europe and carry out joint development activities for the advancement of marine biological resources and associated genomics. In particular EMBRC will support important developments in

system administration and data integration to connect to more global e-infrastructures in life- and environmental sciences. With the objective of becoming a top-level, world-class infrastructure, EMBRC national members will be responsible for advancing Key Enabling Technologies (KETs) for the benefit of the whole EMBRC community.

EMBRC will have much higher leverage than ASSEMBLE (see Glossary) by providing support to both regional and national European governments. As the only truly marine Research Infrastructure in biological and medical sciences as well as the only marine science RI in biology, EMBRC will rapidly become the focal point for implementing the strategic research and innovation agendas and marine environmental policies on regional (e.g. the smart specialisation strategy), national (e.g., the JPI Oceans) and European scale (Horizon 2020, cohesion policy). EMBRC also provides the essential link between biomedical and environmental sciences and the biotechnology sector (Figure 1). EMBRC-ERIC will be a legal body representative of national forces and interests in the area of marine sciences. EMBRC will rapidly gain representation, influence and leadership at the EU level, a development that will serve the attractiveness of Europe in a global perspective. Another critical issue is the regulation of access to marine biodiversity, a topic where EMBRC will play an important role together with other actors

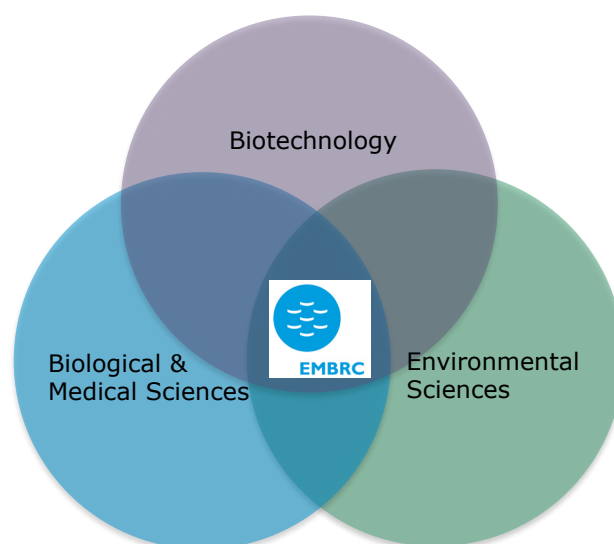


Figure 1. EMBRC positioned within the strategic research landscape with services offered to biomedical and environmental sciences and the biotechnology sector. EMBRC services will serve both the private and the public sector.

such as EC DG MARE and EC DG ENV as well as those involved in addressing the Nagoya protocol. Overall, EMBRC will be a powerful platform to define and meet the strategic needs of marine biology and ecology at regional, national and European scales. It will be instrumental in pooling national marine stations and laboratories, human capital and financial resources into a coherent framework, providing the necessary hardware for joint programming in these areas.

1.3. The need for global positioning

Marine biology and the exploitation of marine resources is a growing strategic issue worldwide (Figure 2), in particular for fast developing economic powers such as China, Brazil and India, as well as for developed economies such as USA, Canada and Japan. Individual marine research stations in Europe are already subject to strong international competition in scientific research and higher education in marine biology and ecology. Internationalisation issues in these areas are currently handled individually by the marine research stations and their operators (e.g. universities, research organisations), resulting in a variety of multiple, non-concerted initiatives. In the long term, this suboptimal strategy will not be sufficient as the established or developing economies in Asia and

America increase their level of scientific excellence and infrastructure quality in marine biology. One sensitive issue when providing access to marine resources for scientific purposes is clearing the rights in the providing countries to use their biota and genetic resources. EMBRC, as an integrated infrastructure, can achieve this internationalisation at a European scale, leading to new cooperation agreements. It is clear also that even though individual marine research stations in Europe do benefit from a scientific and technical know-how leadership today, this leadership is not secured forever and hence it is time to start sharing common interests to preserve this advantage at the European level.

EMBRC will specifically address the above outlined issues by: (1) raising the level of investment in infrastructure and human capital to offer the best service quality, which will in turn attract the best grant holders from both inside and outside of Europe; (2) contributing to the coherence and cohesion of research policies in marine biology across Europe, resulting in a higher and better integrated critical mass at the infrastructure level with a common understanding of strategic orientations; and (3) providing a clearly identified voice that will defend the strategic, long-term interests of the European marine research community. In this way EMBRC can

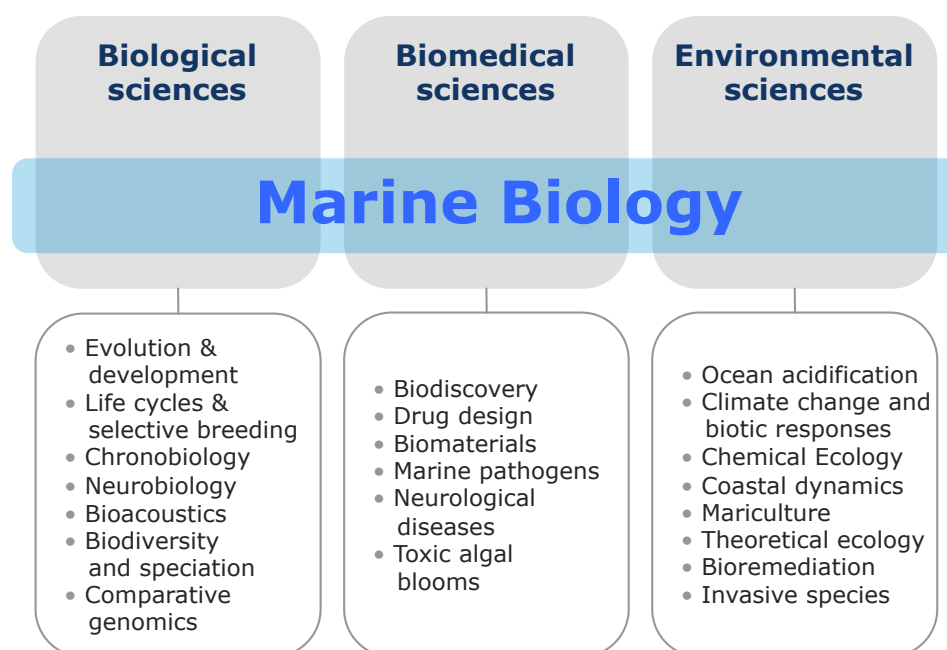


Figure 2. The pivotal position of marine biology in modern sciences.

contribute and bring added value to efforts of EC DG MARE and EC DG ENV as well as platforms such as PharmaSea and Micro B3.

Since EMBRC will be the only integrated marine biology platform of its scale in the world, EMBRC will rapidly become the flagship infrastructure in the recently established global network of marine stations WAMS (World Association of Marine Stations) and will address many of the

issues recognised in the recent Galway Statement on Atlantic Cooperation, that was signed by representatives of the European Union, Canada and the United States.³

³ Maritime Institute. Galway Scientific Workshop Report

2. Impact

2.1. Scientific research

EMBRC will accelerate the pace of scientific discovery and raise scientific standards through mobility, access to the latest facilities, marine biota and ecosystems, and advanced training. In particular, EMBRC will represent a delivery mechanism for EuroMarine+, a bottom-up organisation formed by the consolidation of the three former FP6 Marine Networks of Excellence MarBEF, EUR-OCEANS and Marine Genomics Europe that is contributing to setting the research agenda in marine sciences in Europe from 2013 (Boyen et al., 2012)⁴. In particular, EMBRC will support the research strategy priorities of EuroMarine+, which include (1) enhancing the understanding of marine ecosystem functioning for healthy future oceans, (2) developing scenarios for changing oceans, e.g. through improvement of ecological models, and (3) unlocking the potential of the marine realm for new concepts and as drivers for innovation and technology.

Through EMBRC's involvement with the European Molecular Biology Laboratory/European Bioinformatics Institute and close collaboration

with ELIXIR and other BMS RIs, EMBRC will facilitate the development of new model organisms fully supported by genomic and other molecular resources. Such models have the potential to accelerate scientific progress in biomedical research and the basic biosciences.

EMBRC will provide key scientific services and infrastructure support for the Blue Growth Agenda⁵. This agenda highlights five cross-cutting priority sectors including (1) blue energy, (2) aquaculture, (3) maritime, coastal and cruise tourism (linked to clean/pristine environment), (4) marine mineral resources, and (5) blue biotechnology. Blue Growth is highlighted in the first 3-year strategic programme of H2020 (2014-16), which will feed the first 2-year H2020 call. Complementary to the identified Grand Challenges, the Blue Growth focus areas will coordinate funds and actions to cover the whole spectrum from research to innovation.

2.2. European research programming initiatives

EMBRC will interface with and provide the

⁴ Boyen et al., 2012. EuroMarine Research Strategy Report

⁵ Communication from the Commission COM (2012) 494 final



Preparations for sampling at Sven Lovén Centre for Marine Sciences. © Johan Wingborg

essential research infrastructure for relevant Joint Programming Initiatives (JPIs), namely JPI OCEANS (for marine research coordination between national funding agencies), FACCE JPI (agriculture, food security and climate change research), JPIAMR (research of antimicrobial resistance) and JPI CLIMATE. EMBRC will also support the ERA-NETs related to these JPIs. ERA-NETs already active for the marine sector include SEAS-ERA (marine sector coordination of RTD), AMPERA (coordination action to foster prevention and best response to accidental marine pollution), BiodivERsA (networking European biodiversity research), and MarineBiotech (European research network for marine biotechnology research and development).

EMBRC will provide a mutually beneficial single point of contact between a diverse marine biological science community and other bodies including the European Union, national and regional governments, trade organisations, maritime and blue biotech clusters and individual companies. The RI will provide the scientific services and infrastructure to meet several of the “Grand Scientific & Technological Challenges” identified by the European Commission, including human health and the ageing population (through new drugs from

the sea), self-sufficiency in energy supplies (e.g. biofuels from micro- and macro-algae and bacteria), food security (sustainable aquaculture) and climate change (understanding impacts of, adaptations to and mitigation against effects of ocean warming, ocean acidification, circulation changes and nutrient availability).⁶

2.3. Socio-economic impact

Many marine research stations are situated in geographical locations well away from major concentrations of industry and fulfil an important role in delivering skills, training and employment to regional economies, for example serving aquaculture and niche biotechnology companies.

EMBRC will stimulate the scientific and technological development of the regions in which it will be implemented and will contribute directly and indirectly to stimulate their economy. Smart specialisation strategies in regions where EMBRC is established will result in additional development of research and higher education activities and services and contribute to capacity building. In this way EMBRC will enhance the knowledge-based marine and maritime economy and support the development of local SMEs and industries.

EMBRC will act as a catalyst for investment and job creation in the regions. Some of the regions where the new infrastructure is going to be implemented are located in remote areas (with declining fisheries industries and other socio-economic problems) with unemployment rates above the European average. Direct jobs will be created during the implementation and operation phases, a proportion of which will be highly skilled and well paid. Indirect jobs will also be created to service the infrastructure and as a result of increased scientific and economic activity. EMBRC will contribute to the creation of spin-off and start-up companies in areas related to technology development, exploitation of marine bio-resources and protection of biodiversity. This will increase economic activity and will help diversify the economy in the regions. Given the distributed infrastructure, Europe can be thought as surrounded by marine stations that integrate the EMBRC, promoting excellent science, capacity building, and knowledge transfer and fostering a marine-based bio-economy.



Diver collecting water samples under the Arctic Ice. © Hugh Brown, UK National Facility for Scientific Diving

⁶ Commission communication (COM (2007) 182 final)

EMBRC will act as a centre for knowledge transfer and as a core technology infrastructure for industry, fostering modernisation, innovation and increased productivity. Most EMBRC marine stations are integrated or in close connection with science parks and business clusters and interact with a number of private sector companies. EMBRC will provide the framework and national/international dimension to significantly enhance interactions between science and industry, notably in the key domains of marine resource management and conservation, aquaculture and blue biotechnology. EMBRC will develop a common platform for knowledge transfer that can reach out to both scientists and governmental and industrial decision-makers.

EMBRC will bring higher visibility and increased interregional and international cooperation. While macroeconomic conditions in some countries can constitute an obstacle to implementation of EMBRC, the level of economic development of these regions can facilitate funding of infrastructure. The international use of the infrastructure and the high mobility of researchers of EMBRC marine stations and laboratories will result in higher visibility and will act as a catalyst to attract companies and investment to the regions promoting their development. EMBRC will also act as a focal point of knowledge, innovation and exchange of

information for SMEs that will benefit in particular the less developed regions, reducing inequalities, promoting employment and increasing European societal cohesion.

2.4. Impact on industrial users

Marine waters provide resources and services estimated at 60% of the total economic value of the biosphere, and with the increasing demand for marine products and the emergence of novel usages of marine species (e.g. for marine renewable energy), marine life is becoming a new frontier in the bioeconomy of our territories (Blue Growth; see Glossary).

The Organisation for Economic Co-operation and Development (OECD) has placed strong emphasis on the fact that biological resource centres (BRCs) are an essential part of the infrastructure requirements for the development of bioresources⁷. In a recent report⁸ focused on the contribution of marine biotechnology to economic and social prosperity, the importance of Research Infrastructure for generating and sharing knowledge was again stressed. As the main BRC devoted to access to marine bioresources, EMBRC will rapidly gain a high profile among users from the private sector (Figure 3). The EMBRC community

7 OECD, 2004

8 OECD, 2013

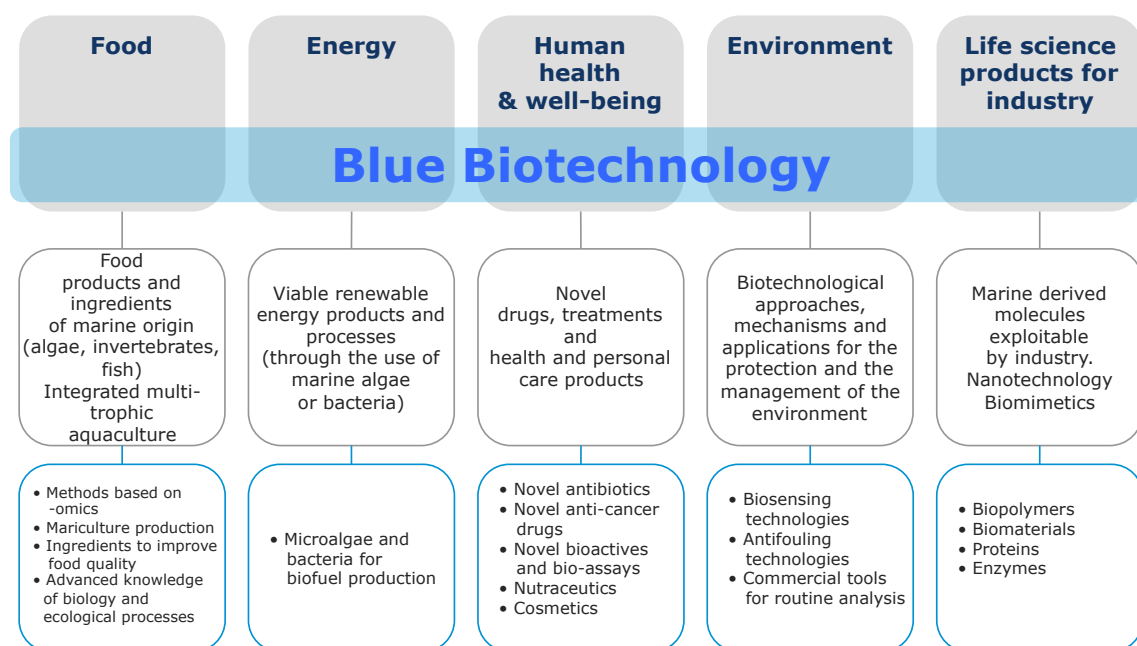


Figure 3. Marine systems are the most promising source of new innovations, new resources and new products for the industrial sector. (Modified after Marine Board-ESF, 2010).

covers the whole range of marine biodiversity, using science approaches as diverse as molecular and cell biology, biochemistry, chemistry, chemical biology, biophysics, genomics, bioinformatics, biomathematics, integrative biology, reproductive biology, breeding, population genetics and host-pathogen relationships. Application sectors range from gene and cell engineering (molecular farming, cell factories), biorefineries, biostatistics, software development, biosensors, nutrition, medicine and health care, aquaculture, crop disease control and environmental management and remediation, to bioenergy and biomaterials.

By grouping such a comprehensive body of experimental systems (microbes, algae, animals) as well as research excellence in marine biology and ecology, EMBRC will improve the efficiency

of characterisation and sustainable exploration of marine diversity. It will also provide a comprehensive platform connecting marine biological researchers and industry. For every sector in the marine knowledge-based bioeconomy, companies will be able to quickly explore the entire EMBRC community and access the available knowledge in EMBRC that is relevant for their innovation targets, safeguarding all intellectual property rights. This will attract companies that have not previously considered the use of marine resources to expand their businesses. Also, the combination in EMBRC of competencies in both biology and ecology will provide industrial leaders with unique opportunities to contribute to the welfare of mankind in a sustainable and environmentally compatible manner.

3. The Mechanisms

3.1. EMBRC's legal form and governance

EMBRC will be governed as a centralised network of nodes, located in different countries, each locally managed by national operators. EMBRC will rely on existing local administration and will allow by means of its governance standardisation, integration and common management process.

3.1.1. Legal form

Following a comparative study of different legal options for EMBRC, the partners of EMBRC in the preparatory phase decided to apply for the legal status of the European Research Infrastructure Consortium (ERIC; see Glossary) to operate the infrastructure.

EMBRC-ERIC will be a centralised organisation with a distributed operation, based on a subsidiarity model⁹. EMBRC-ERIC will maintain a central hub, comprising a Director and a Secretariat. The user services will be performed on-site at EMBRC nodes¹⁰ in multiple locations and in different countries. The EMBRC-ERIC will be run by state-level governance and managed by the independent EMBRC-ERIC Director assisted by the EMBRC-ERIC Secretariat, which will manage the access to the available resources as well as the services and activities carried out by the EMBRC nodes.

EMBRC-ERIC will be established on the date when the European Commission decision to set up the EMBRC-ERIC takes effect and will be governed by its statutes and service-level agreements with the national operators of the marine stations and research centres.

⁹ The EMBRC subsidiarity model is based on the operation of a central European-level hub for the coordination of services and activities rendered by all EMBRC nodes.

¹⁰ An EMBRC node is a part of national operator's assets (facilities, resources, services) made available to EMBRC-ERIC by means of service-level agreements. The node is usually located in a marine research station or laboratory of said national operator and under the operational responsibility of a director. The marine station/laboratory remains under the legal authority of the national operator.

3.1.1.1. EMBRC-ERIC Statutes

The EMBRC-ERIC Statutes are the set of rules of procedure for the governance and management of EMBRC-ERIC operations. The EMBRC-ERIC will operate under statutes approved by the member states.

3.1.1.2. Service-level agreements

The service-level agreements will be the internal agreements negotiated between EMBRC-ERIC and the national operators and will define the services, resources and access to the facilities (marine stations, laboratories, institutes) that the national operators will grant to EMBRC-ERIC users. They will also include all in-kind contributions, set by the national operators themselves. The service-level agreements will be formally defined and made available to EMBRC-ERIC in accordance with its Statutes.

3.1.2. Governance

The EMBRC governance model has been designed to secure the interdependence between the decision-making, management and operational bodies of EMBRC in order to function as an integrated Research Infrastructure and align the interests of all EMBRC stakeholders. The governance structure of EMBRC-ERIC (Figure 4) will comprise four levels including a governing, an executive, an operational, and an advisory level.

3.1.2.1. Governing Board

EMBRC-ERIC will be governed by the Governing Board, which comprises two representatives (one administrator, one scientist) of each EMBRC member¹¹. The Governing Board has decision-making power related to the EMBRC strategy, governance and scientific development (for a more detailed description see Annex 4).

3.1.2.2. EMBRC-ERIC Director

The executive level comprises the EMBRC-ERIC Director, who is the executive authority and legal representative of the ERIC. This position will provide strategic leadership of the Research Infrastructure

¹¹ EU member states, associated states and international organisations listed in the ERIC Statutes.

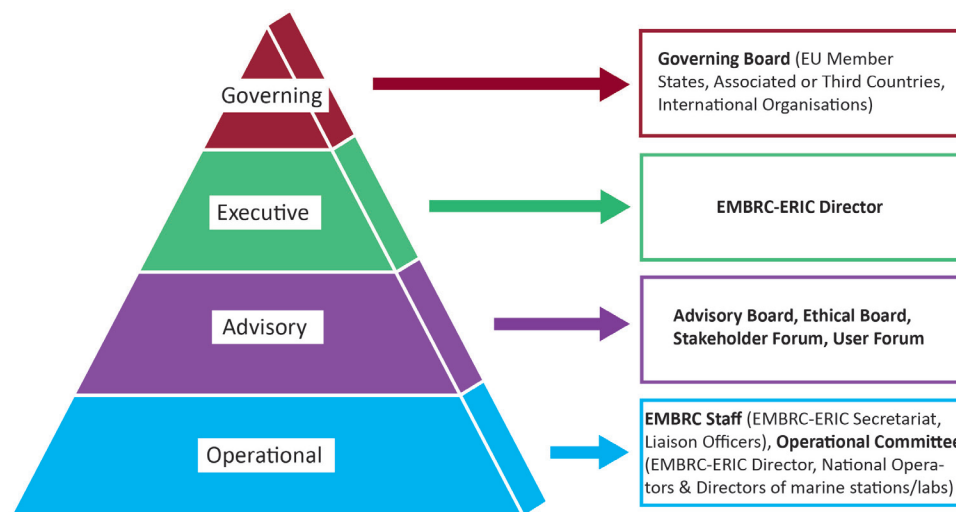


Figure 4. EMBRC-ERIC governance structure.

and drive the project to achieve its goals by raising funds, identifying opportunities, and setting EMBRC's vision, plan and strategies. In addition, the EMBRC-ERIC Director will be responsible for building the EMBRC community and for directing and coordinating operational activities at the highest level. The Director will be appointed by the Governing Board and will have full autonomy and independence within the framework provided by the EMBRC-ERIC Statutes. The EMBRC-ERIC Director will head the EMBRC-ERIC Secretariat and appoint its staff.

3.1.2.3. Advisory Bodies

The advisory level consists of an Advisory Board, an Ethical Board, a User Forum and a Stakeholder Forum. The Advisory Board will be composed of 10 high-level scientific experts from academia and industrial sectors, elected by the Governing Board amongst a list of renewed experts. Its function is to advise the Governing Board for strategic planning.

The Ethical Board will be designated to monitor research involving marine organisms, in view of the risks involved with their use and exploitation. The Ethical Board will be an independent group of experts who will deal with relevant ethical issues within EMBRC, in accordance with the highest scientific standards and all European and national regulations related to biological resources (see also Chapter 3.3.4.).

The User Forum will consist of representatives of the EMBRC user community (academia, local node resident researchers, industry etc.). The EMBRC

User Forum will meet annually with EMBRC-ERIC representatives, and its role is to provide input from users regarding their demands from EMBRC.

The Stakeholder Forum will be composed of policy makers and regional and local authorities. It will meet once a year with EMBRC-ERIC representatives, and its role is to provide input on the interest of stakeholders.

3.1.2.4. Corporate Functional Organisation

The operation of EMBRC relies on the EMBRC-ERIC Secretariat for general management and administration (Figure 5). It will be the central point for communication, dialogue with stakeholders (users, funding agencies) and international promotion of the infrastructure. The Secretariat will organise all governance and management meetings and will be in control of the user access system including handling of user applications and evaluations, coordination of access provision, and related legal and financial aspects. The Secretariat will also coordinate all networking activities and will be responsible for quality assurance and risk management of EMBRC activities.

The EMBRC-ERIC Secretariat will have different staff in the implementation phase and in the operational phase. In the implementation phase, the Secretariat will consist of a Secretary, a Financial Manager and a Legal Officer. In the operational phase, the Secretariat will additionally comprise an Access Programme Administrator, a Knowledge Transfer and Innovation Officer and a Communications Officer (see Annex 4).

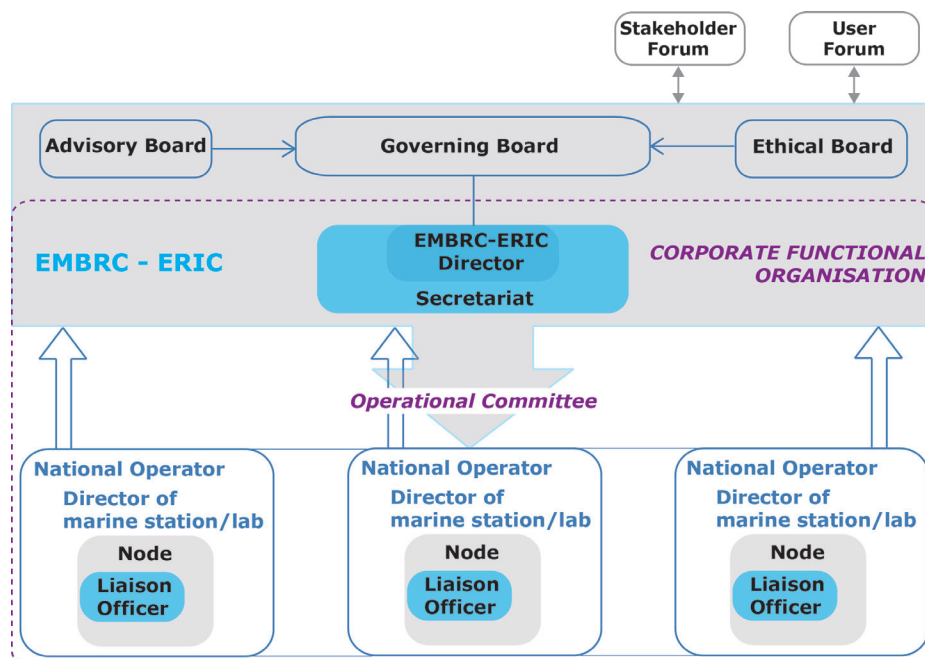


Figure 5. The EMBRC governance structure provides full autonomy of the RI in strategic decision making and priorities setting. The EMBRC governance structure relies on the internal organisation and administration of the marine stations and labs, which retain their autonomy over the activities outside the interest of EMBRC. The structure creates effective links between the different levels of the RI via a Corporate Functional Organisation with an Operational Committee for implementing decisions and via Liaison Officers in the nodes for smooth running of daily operations.

Another important role in the EMBRC-ERIC operation will be filled by the EMBRC Liaison Officers, which will provide the practical link between the central hub (Director and Secretariat) and the nodes. It is planned that one such Liaison Officer will be positioned at each node and will work in close collaboration with the EMBRC hub and the marine stations/laboratory directors, under the responsibility of the national operators. The main tasks of the Liaison Officer will be to liaise with the central hub for effective implementation of the EMBRC-ERIC decisions. The Liaison Officer will be the contact person for users on site and will guarantee excellent service transmission (see also Annex 4).

The EMBRC Operational Committee comprises the EMBRC-ERIC Director, representatives of the national operators and directors of the marine stations/laboratories. It will ensure an effective link between the EMBRC central hub and the nodes. The Operational Committee will ensure that the decisions made at the European scale are implemented at the nodes and will also capture feedback from the nodes on upgrades, needs and technical issues.

The Operational Committee together with the EMBRC-ERIC Secretariat and EMBRC Liaison Officers will be part of the Corporate Functional Organisation of EMBRC (Figure 6). The EMBRC Corporate Functional Organisation will function as the operative structure of EMBRC to lead the administration of all services and activities provided by EMBRC-ERIC, setting up clear lines of communication and implementing decisions within the operational level, in a timely and cost-effective manner.

3.1.3. Next steps towards implementation

The preparatory phase project ends in January 2014 and with it the current project governance. Following the preparatory phase, EMBRC will continue working towards the formal implementation of the EMBRC-ERIC, striving to gain the financial commitment and technical support by national authorities and funding bodies. In order to manage the implementation phase, EMBRC will establish an interim governance structure to run the project since many critical decisions regarding the setting

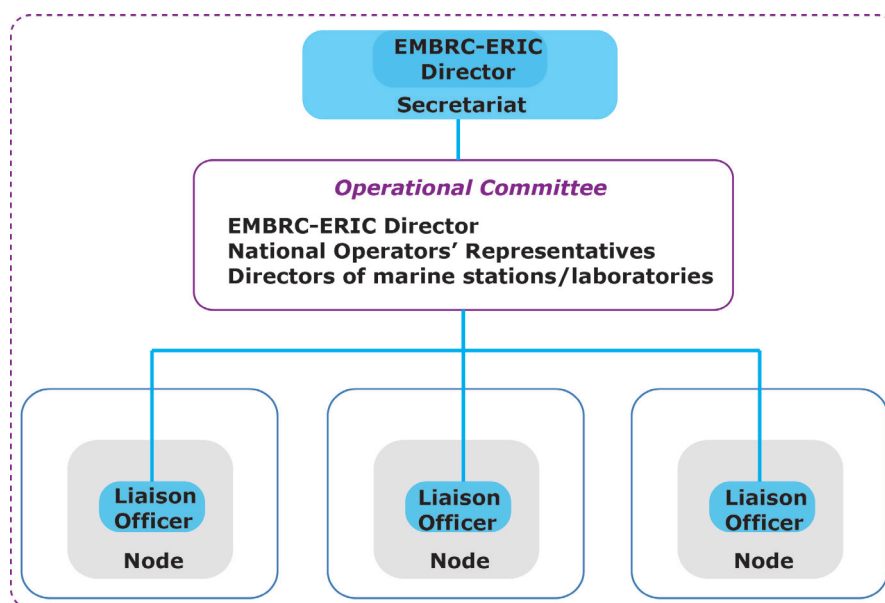


Figure 6. The EMBRC Corporate Functional Organisation.

up of the ERIC will need to be agreed upon during this period.

A Memorandum of Understanding (MoU) will set the legal framework during the implementation phase. The signatories of the MoU (countries or intergovernmental organisations) will undertake the responsibility to support the activities of EMBRC-ERIC until the decision by the Commission to set up EMBRC-ERIC takes effect. This will include the appropriate funding/support (see also financial plans, Chapter 4.2.1.).

The MoU will be opened to signature to any interested party fulfilling EMBRC qualification criteria for integration of Associate Partners (see Annex 3). It is not expected that all ppEMBRC partners' countries will sign the MoU immediately. However, some countries (either EU member states or associated countries) have already expressed their interest in signing the MoU towards the establishment of EMBRC-ERIC, including France, Italy, Portugal, Belgium, Israel, Greece, Malta and

the intergovernmental organisation European Molecular Biology Laboratory (EMBL). Decisions are pending from Sweden, Norway and the UK.

The governance of the project during the implementation phase (IP) will comprise an EMBRC Implementation Board with two appointed representatives, comprising one scientist and one administrator, per MoU signatory. The IP Advisory Board, comprising 10 members, will be elected by the Implementation Board from a list of renowned experts. The EMBRC central hub will function with 3 FTE positions (EMBRC Director, Secretary, Financial Manager, Legal Officer; see also Annex 4). EMBRC governance will operate according to the MoU signed by the member states and the rules of procedure adopted by the EMBRC Implementation Board.

Once EMBRC is awarded ERIC status by the European Commission, the MoU will terminate and EMBRC-ERIC will operate under its Statutes.

3.2. Infrastructure

3.2.1. Existing infrastructure

EMBRC is built upon some of the most advanced and well-equipped marine stations and laboratories in Europe (Annex 1), where top-level marine biological research is conducted. EMBRC will offer a single access entry point to a range of marine ecosystems and organisms as well as a series of state-of-the-art services, metadata and platforms including (1) aquaria and culture facilities, (2) biological collections, (3) 'omics platforms (genomics, proteomics, metabolomics), (4) e-infrastructure, (5) imaging and microscopy platforms, (6) coastal research vessels and instrumentation, (7) scientific diving, (8) teaching and seminar facilities, (9) libraries and (10) accommodation.

The comprehensive services offered by EMBRC will enable users to achieve their research objectives effectively and efficiently. All EMBRC platforms and services are run by dedicated expert staff available to assist the users. EMBRC will advertise its services through several media and will develop an EMBRC service database containing comprehensive and detailed information about all EMBRC infrastructure, ecosystems and organisms, and human resources. The service database will be searchable online and will be linked with the EMBRC online application system designed for EMBRC users.

3.2.1.1. Access to marine ecosystems

EMBRC provides access to a range of marine ecosystems, including kelp forests, coral reefs, intertidal rocky shores, lagoons, mudflats, deep-



A Risso's dolphin (*Grampus griseus*) fitted with a digital acoustic reading tag to examine sound acoustics and behaviour. US research permit 14534. © Ari Friedlaender



Research vessel and marine monitoring station *Poseidon*. © OLYVON. Hellenic Centre for Marine Research

sea environments as well as planktonic and pelagic communities. Special sites and extreme environments are also provided including (1) volcanic cold seeps, that can be used as proxies for the future high CO₂/low pH oceans, (2) polluted low-oxygen sites that enable environmental impact studies, and (3) artificial habitats such as renewable energy test sites for research on bio-fouling etc. Access to subtidal ecosystems will be provided through research vessels, remotely operated and autonomous underwater vehicles (ROV/AUV), scientific diving and *in-situ* monitoring equipment. Specialised services are available for satellite tag and sensor designs for tracking large marine organisms, such as mammals and turtles in their natural habitat.

3.2.1.2. Provision of marine organisms

EMBRC will provide marine organisms for research and technological development purposes both collected from the wild and cultivated. The organisms to be provided range from vertebrates, invertebrates and seaweeds to microalgae and protists, bacteria and viruses, including taxonomic reference collections of past and present regional biodiversity. Mutant and transgenic strains will be available for some model species. EMBRC will provide taxonomic identification services by dedicated staff as well as services for validation and benchmarking of research organisms and strains.

Ethical standards and nature conservation requirements limit the availability and/or types of research on certain species such as mammals, turtles and those on the IUCN Red List of Threatened

Species¹². Strict adherence to ethical standards and 3R policies (Reduce, Reuse, Recycle) will be ensured. EMBRC-ERIC guarantees conformity with national and international regulations concerning collection, maintenance/cultivation and shipping of biological resources. Provision of some organisms may be restricted by seasonal occurrence or abundance. Ethical issues will be overseen by the EMBRC Ethical Board (see also Chapters 3.1.2.3. and 3.3.4.).

Organisms are generally made available at the EMBRC nodes but some organisms, laboratory cultures, cell lines, tissues, tissue cultures and DNA can be provided remotely by courier. Remote access to biological resources will be subject to Material Transfer Agreements stipulating terms and conditions of use, including guidelines for proper disposal and environmental protection.

3.2.1.3. Access to experimental aquaria and mesocosms

An extensive range of experimental aquaria and special tanks are available to EMBRC users for rearing and experimenting with marine organisms. Also available are specialised control facilities to modulate environmental conditions (i.e. temperature, salinity, pH and various water purification systems), to keep invasive species and genetically modified organisms (GMOs), as well as bioreactors, mesocosms, greenhouses, licensed marine vertebrate holding tanks and experimental facilities. Technical support for these facilities is provided.

12 The IUCN Red List of Threatened Species



Seasquirts (*Ciona intestinalis*) in their natural habitat. © Yann Fontana, Station Biologique de Roscoff (CNRS/UPMC)

3.2.1.4. Access to 'omics platforms

EMBRC users will have access to standard molecular laboratories and high throughput molecular analysis tools through genomics, proteomics and metabolomics platforms. These facilities include a range of state-of-the-art equipment including sample manipulation robots, next-generation sequencers, laser scanners, and specialist equipment for mass spectrometry, flow cytometry, and magnetic resonance. In particular, EMBRC nodes will play a central role in the planned creation of a global network of Genomic Observatories¹³.

3.2.1.5. Access to high-resolution bio-imaging platforms

Bio-imaging platforms comprise equipment for scanning and transmission electron microscopy, confocal laser scanning microscopy and state-of-the-art image analysis. The platforms also include the required sample preparation facilities, e.g. for thin sectioning and staining. EMBRC has plans to collaborate with the BMS RI Euro-Biolmaging regarding procedures, good practices, standards and complementary services.

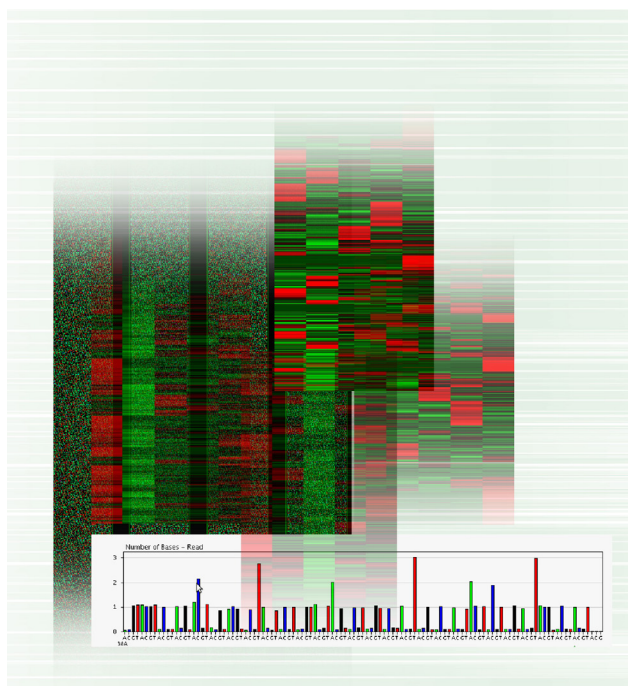
3.2.1.6. Access to e-infrastructure

The EMBRC e-infrastructure will process, curate and store large datasets of sequences, metadata, historical time series and library resources. Software and bioinformatics technical support will be available for sequence assembly, annotation, and statistical, phylogenetic and other analyses.

13 Genomic Observatories Network



Researcher working in plankton laboratory. © Johan Wingborg



Next-generation sequencing of marine organisms. © IMBCC-Hellenic Centre for Marine Research

3.2.1.7. Access to conference and hosting facilities

EMBRC partners' facilities lie in close proximity to hotels and restaurants. Some EMBRC nodes will have in-house accommodation and catering facilities for users. A variety of facilities are also available for seminars, (video-) conferences and teaching.

3.2.2. Planned infrastructure

The EMBRC investment plan comprises upgrades and new infrastructure, largely from 2013 to 2017, and totals more than M€120, half of which has been approved (see also Chapter 4.1. and Annex 5). Major investments are planned in aquaria and culture facilities, research vessels, imaging and microscopy facilities, molecular platforms, e-infrastructure and accommodation (Figure 7). In addition, large-scale investments are planned in special facilities including a biomedical and bioscience training centre, a biodiversity and genomics observation platform, a bioacoustics test facility, and dedicated outreach facilities. In addition, operating and staff costs of M€10.1 are expected for the same period.

While these investment plans refer to EMBRC partners in the preparatory phase, further investments are expected from Associate Partners joining EMBRC, which will increase the range of services offered. EMBRC is open to new partners, which will increase the access coverage of marine ecosystems across European seas (e.g. the Black Sea) and add further complementary research infrastructure.

3.2.2.1. Planned e-infrastructure

At each marine station, core bioinformatics facilities will be linked to each other and to national bioinformatics centres, in particular ELIXIR nodes. The EMBRC partner European

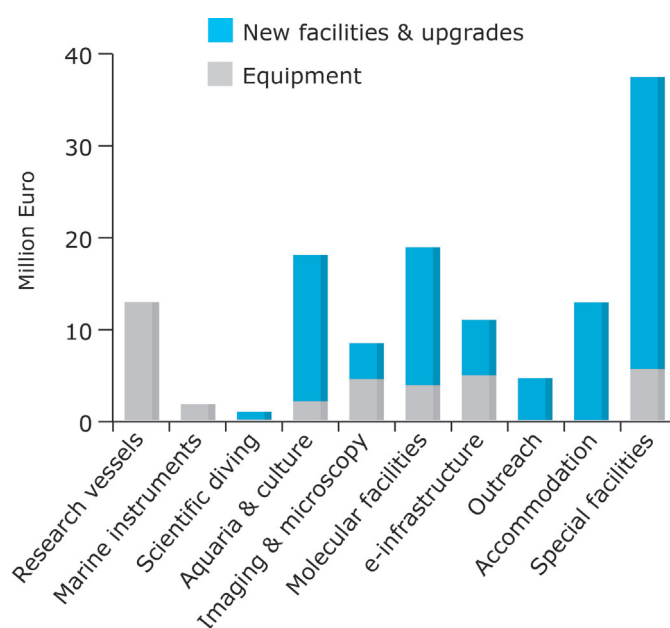


Figure 7. Planned investment in new infrastructure (2013-2022).

Bioinformatics Institute, which is part of the European Molecular Biology Laboratory (EMBL), will provide advice to bioinformatics teams at the nodes' locations on coordinated database integration, software development, training, data analysis, standardisation and data storage in public repositories. The EMBRC bioinformatics team will collaborate with university scientists and genome centres to promote e-infrastructure interoperability and standardisation, in order to deal with large volumes of different types of data generated by marine research and in the process bring together marine scientists and bioinformaticians/IT specialists.

The data facilities will consist of computational clusters and data storage requiring regular upgrading. To ensure safe long-term data storage and public availability, data will be deposited in public repositories as they become available, e.g., molecular data by EMBL, biodiversity data by EurOBIS and LifeWatch, georeferenced data by PANGAEA and image data by Euro-BioImaging.

3.2.3. Review, update and discontinuation of RI elements

EMBRC will be active for at least 25 years. It will be responsive to the changing requirements of the users and will be at the forefront of trends in research and innovation. To achieve its mission, EMBRC will implement procedures to receive and respond to feedback from its users and to monitor trends in scientific research, national and European priorities and societal needs. Regular internal and external reviews will contribute to maintain excellence standards, to revise out-dated methods and infrastructure and to introduce the latest equipment and technologies.

The review process will take place every two years and will be coordinated by the EMBRC-ERIC Director and implemented at the nodes. The review report will identify shortcomings, bottlenecks and problems and will suggest improvements to services. It will be evaluated by the EMBRC Advisory Board, which will make recommendations to ensure that EMBRC maintains top-quality services and cutting-edge facilities. The recommendations and advice will guide plans for joint research and development activities (see also 3.3.2.).

3.3. EMBRC-ERIC activities

3.3.1. Management, promotion and marketing

Marketing of EMBRC to make it well known among policy makers, funders and users is of critical importance to ensure EMBRC's success. The EMBRC-ERIC Secretariat will be responsible for managing the development and marketing of the EMBRC brand. It will coordinate and execute networking activities to promote EMBRC with appropriate tools, including the design and maintenance of the EMBRC webpage as the central entry point to information about and access to EMBRC.

The EMBRC-ERIC Secretariat will maintain a dialogue with stakeholders (users, funding agencies) and will be the reference point for communication with supranational organisations including the European Union and for establishment of cooperation agreements.

3.3.2. Joint development activities

The provision of marine biological resources and of in-house analytical platforms specialised for marine biological research is the most distinctive and emblematic service of EMBRC and therefore, EMBRC has the duty to strive to constantly improve the quality and range of its services. This will be achieved via a coordinated, long-term development programme involving collaboration among all EMBRC partners and user groups including industry.

These joint development activities will lead to the implementation of best practice guidelines for aquarium, culture and analytical facilities that will be disseminated throughout EMBRC so that the overall standard of the infrastructure is raised continually. Overriding principles guiding the R&D programme will include protection of the environment (e.g. reduction of pressure on wild stocks by ex situ cultivation; biological security including disease control, quarantine and strict containment of biohazards including genetically modified organisms; standards for energy usage and waste water treatment), ethics and welfare considerations for the use of animals, and health and safety of EMBRC personnel and users.

The R&D programme will focus on improving existing services and on developing new services in response to changing scientific and biotechnological research priorities and emerging societal challenges. With

the objective of developing a top-level, world-class infrastructure, EMBRC will also be responsible for carrying out the development of more generic Key Enabling Technologies. This will be achieved via a coordinated, long-term R&D programme designed to achieve the following objectives:

1. Make the next high-priority technological and methodological breakthroughs for collection, long-term *ex situ* maintenance and transport of live unicellular and multicellular marine organisms and for development of culture facilities capable of better simulating natural environments
2. Create genetic resources such as mutant collections and transgenic lines for flagship eukaryotic and prokaryotic model organisms
3. Adapt and develop 'omics and imaging methods for high throughput environmental biodiversity studies and functional exploration of key marine models in the tree of life
4. Develop new models with high biological or ecological relevance (e.g. representing key functions in the ecosystem) along with the tools needed for advanced research including permanent cultures of ecotypes and inbred lines, full genome sequence information, genetic tools for functional genomics, pipelines for phenotypic characterisation, and a database providing access to relevant genetic and ecological data
5. Develop bioacoustic imaging technology for plankton-sized organisms to cetaceans. Drive the technology development of novel sensors, data tags and communications systems for monitoring organismal function and the environment
6. Develop the e-infrastructure component of EMBRC, which will be critical both as a means of managing the resources and as a major tool to facilitate exploitation of the resources

3.3.3. Knowledge transfer to industry and policy makers

EMBRC will be included in a platform for knowledge transfer that can reach out to scientists as well as to government and industry. The method for knowledge transfer will follow that developed by several EMBRC partners in the CSA Marine Genomics for Users (MG4U). This tool will allow users to find exactly what is relevant to their innovation strategy. In relation to the promotion of EMBRC, other dissemination media will be developed, including attendance at specialised business conventions.

This activity, led by the EMBRC-ERIC Secretariat, will markedly increase EMBRC's economic impact.

3.3.4. Access clearance to marine biodiversity

EMBRC will be at the forefront of the use of marine biodiversity for research and development purposes. It will strive to give full access and supply marine biological material to users whether this material is available and/or has been collected within the European Union countries' sovereignty or outside EU territories (foreign providing countries, the High Seas). However, access to marine biodiversity and the use and supply of it are ruled by legally binding texts within complex international, European and national legal frameworks, such as the United Nations Convention on the Law of the Sea (UNCLOS), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the European Marine Strategy Framework Directive, the Convention on Biological Diversity (CBD) and its Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Utilization. Therefore, EMBRC must undertake to provide full legal clearance for access to biological material, including genetic material, whether freshly collected on-site, cultured, or available in its collections. To do so, the EMBRC-ERIC Secretariat will, with the input of the Ethical Board, provide the following services:

- It will analyse EMBRC collections and standardise associated procedures (from biological material-transfer agreements to tracking systems) at the nodes following a protocol established by ASSEMBLE
- It will establish, execute and update a risk assessment methodology and engage with marine station/node representatives to comply with a legal/fair and equitable acquisition of the material and manage the benefit-sharing principle
- It will provide users, national operators and marine station/nodes with training, best practices, guidelines and standards, together with model agreements to be adapted in the national legal frameworks, to help all of these comply with the various legal binding frameworks
- It will establish and operate a monitoring and tracking system for the use of the bioresources to ensure the implementation of the benefit-sharing principle

3.3.5. Education and training

One key task of marine research stations in Europe is to provide education and training via a range of marine biological sciences courses ranging from general marine biodiversity and ecology for Master's students to specialised training courses for PhD students and research visitors (users). Marine stations are the ideal places to give such courses, since they provide direct access to marine ecosystems and biota, supporting infrastructure, scientific and technological expert personnel, and teaching and training expertise.

EMBRC will establish and operate a service dedicated to the organisation of EMBRC's education and training courses at the EMBRC nodes as well as to related activities such as promotion, updating and monitoring of these courses. This EMBRC training infrastructure will support the development of tomorrow's marine and blue biotechnology professionals.

The service will specifically:

- Group and advertise marine training initiatives in a coherent and integrated way (EMBRC-ERIC training hub)
- Liaise with appropriate EC Erasmus programmes
- Attract and actively capture new training initiatives
- Offer services to training and education organisers and participants, including application and registration

- Offer a dedicated e-learning platform to facilitate e-training
- Offer a platform through which training grants can be advertised and promoted
- Allow long-term follow-up of training events and trainees
- In-house staff training for best practice, career development etc.

This service will maintain a web portal on training and education that will include a centralised information resource with searchable catalogues, targeted to people in search of training possibilities related to marine research. Calls will be distributed within the RI to solicit proposals for new courses and select on-going course programmes for incorporation in the EMBRC training and education programme. Data on performance, effectiveness and impact of EMBRC courses will be collected from participants in order to produce assessment reports. A quality control procedure will aid certification of the courses within European higher education curricula.

The EMBRC training portal will be set up by the Belgian EMBRC node (collaboration between Gent University and Flanders Marine Institute – VLIZ). They will establish a pan-European platform for education and training, helping European scientists, technicians and other stakeholders to navigate in the vast realm of courses related to marine sciences and blue biotechnology. The platform will be set up



Student investigating a Norway lobster (*Nephrops norvegicus*) at the Sven Lovén Centre for Marine Sciences. © Johan Wingborg

in a generic way so it can be easily connected with existing, complementary platforms.

3.3.6. Collaborations and interoperability with sister RIs, JPIs and ERA-NETs

EMBRC will develop collaborations with other ESFRI RIs to foster interoperability and synergies for contributing to a comprehensive European RI service provision (Figure 8). The collaborations are expected to provide complementarities to EMBRC. Examples include:

- Building pipeline services to allow users smart access to a chain of complementary services
- Sharing procedures, databases and protocols will aid users and contribute to the interoperability and standardisation of data across the European RI landscape
- Shared organisation of workshops, in particular on standardisation and shared best practice guidelines
- Coordination of activities regarding knowledge and technology transfer
- Shared organisation of brokerage events with industry, stakeholders and policy makers and other events for the promotion of ESFRI RIs
- Harmonisation of access systems among ESFRI RIs to facilitate service provision for RI users

Such developments involve plans for coordinated

activities for promotion of EU RIs and the organisation of matching events with funders and policy makers (EU, JPIs, ERA-NETs), shared knowledge and technological development and dissemination, as well as shared training of technical and administrative RI staff.

3.3.7. Audit, risk management and quality assurance

An online risk register was developed during the preparatory phase of EMBRC. It detailed the potential risks and their owners, as well as mitigation strategies in the form of different scenarios, including alternative financial and technical options. These procedures should manage risks during the implementation phase to avoid disruptions to plans and/or cost escalations. Risk management procedures will be subject to external validation and review during the implementation phase. The specific risks already identified for the implementation phase and possible mitigation strategies are as follows:

- 1. Insufficient financial support and interest to sustain the implementation phase.** The long period between the end of the preparation phase in January 2014 and the end of the implementation phase in 2016 (when the ERIC is expected to be approved) may result in a loss of momentum with some countries unwilling to fund subscriptions in

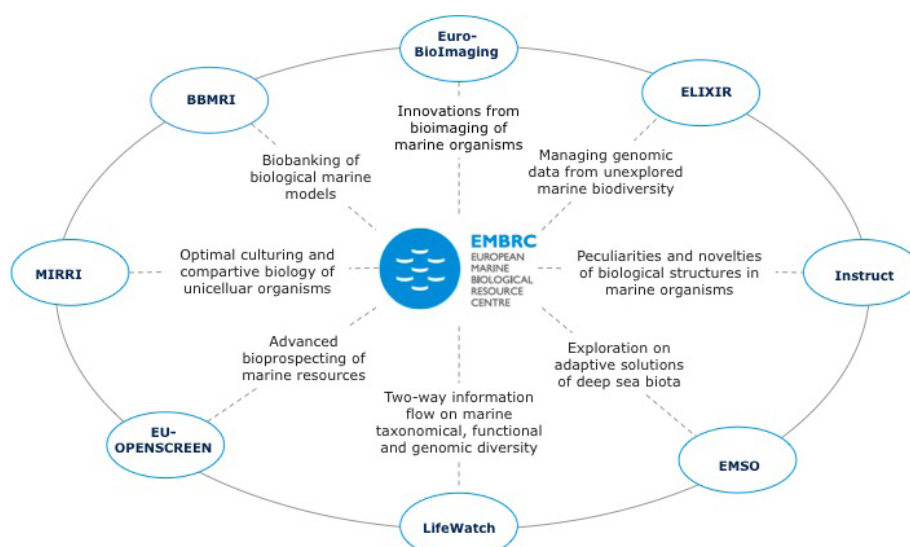


Figure 8. The strategic position of EMBRC among other RIs. Some examples for strong complementarities and potential synergies with both BMS and ENV RIs are indicated.

the absence of the anticipated activity and income generation associated with the operational phase. Delaying joining would save money, but would also result in a lost opportunity to shape the governance and technical plans for the operational phase. Four countries (Italy, France, Sweden and Malta) have bid to host the EMBRC statutory seat and are presumably committed to making subscriptions. Three of the four countries have also offered to underwrite a major part of the salary bill of the central hub staff and provide “free” utilities, office accommodation and other services. This will further reduce the risk that the EMBRC implementation phase will have insufficient money for the planned activities.

2. Loss of expertise from ppEMBRC. The Business Plan does not include money to continue to employ the key Technical Officers from ppEMBRC during the implementation phase. This could result in a loss of knowledge amongst a group of mostly early and mid-career staff, most of whom are on short-term contracts, unless partners are able to win funds locally to keep these people in post. Some of the senior established staff members who have been influential in driving EMBRC, including several members of the current Steering Committee, will have retired before the operational phase begins in 2016, potentially resulting in a loss of leadership. This risk will be mitigated by ensuring sufficient subscription income during the implementation phase to retain some of the ppEMBRC Technical Officers. In addition, succession planning at the

nodes will ensure the future supply of senior staff to sit on EMBRC committees and working groups.

4. The Business Plan relies on EU funding.

Approximately M€3.1 out of M€6 of income for the operational phase (52%) is planned to come from direct Europe 2020 funding. Some proportion of a further M€1 is planned to come from European research councils grants. The expectation of about M€20 funding for EMBRC over a 5-year period from European sources may be overly optimistic given the number of Research Infrastructures and other pressures on funding. This risk could be mitigated by putting more effort into attracting private sector money into EMBRC, but it may require additional investment in the EMBRC-ERIC Secretariat and staff at the nodes for networking and marketing. Industrial users will pay FEC+ and it is planned that the premium will be shared equally between the nodes and core (for core functions), providing a powerful incentive to increase income from non-public sources as well as stimulating innovation. Technical Plans will be developed, which include a sensitivity analysis of the expected income to EMBRC and the diversification of income streams. It is also worth noting that the putative partners of EMBRC raised an average of more than M€4/y in the previous EU Framework Programmes for Research and Technological Development FP5, FP6 and FP7. This clear evidence of funding success based on internationally recognised scientific expertise and quality of putative partners will mitigate the risk, especially since EMBRC will strengthen the competitiveness of partners for EU funding.

4. Financial Plans

4.1. Capital requirements – Future infrastructure investments

The EMBRC partners of the preparatory phase have identified major equipment and building upgrades that will total M€56.2 and are aimed to be completed by 2017 (Table 1). A strategic view of capital requirements beyond 2017 carried out in a ppEMBRC survey identified a further M€69.8 of investments among the preparatory phase partners/beneficiaries during the subsequent years. Plans for future investments will be reviewed during the implementation and operational phases considering new partners, user needs and strategic priority setting. Resources for such investments will have to be sought from member states and/or regions through competitive funding calls and regular budgets. A further breakdown of capital expenditure with some examples is provided in Annex 5.

4.2. Revenue requirements

4.2.1. The implementation phase

During the implementation phase, key staff (EMBRC-ERIC Director, Secretary, Financial Manager and Legal Officer, totalling 3FTEs from the start; see also Annex 4) will prepare EMBRC for the operational phase. Table 2 provides the estimated expenditure for this phase, including the hiring of staff, establishing the office, and some essential enabling activities related to governance, marketing, promotion and staff training. This phase will start in early 2014 at a gross cost of M€1.1 over two years.

Awaiting the selection of a host country for the EMBRC central hub (to be decided by the initial MoU

signatory states), the share of the host's cash and in-kind contribution may differ slightly from what is indicated in the budget. However, the remaining part of the budget, to be covered by membership fees, represents less than one-third of the gross costs. The budget indicates membership income at the minimum level of three signatories (referring to the EU ERIC regulation; see Glossary). Should a further number of countries decide to join from the start, income will increase as well as the level of integrating activities and adjoining costs.

The model presented herein has set the membership fee at €50 000 for smaller and €80 000 for larger partners during the implementation phase. The distinction between large and small partners will be made by the EMBRC Implementation Board (Chapter 3.1.3.). For the purposes of this business plan, it has been based on the number and size of the nodes contributed by the partner country to EMBRC, assuming that a larger investment in the infrastructure will result in larger rewards for the country. When entering the operational phase in 2016, fees are planned to increase to €60 000 and €100 000 respectively in order to cover for an expected increase in integration activities in EMBRC-ERIC (see Table 3). During the implementation phase, costs are related primarily to personnel costs at the central hub, meetings and set-up of the office. Value-added EMBRC service activities are expected to start at a modest level, increasing in the operational phase from 2016 onwards. The national operators will sign service-level agreements with EMBRC-ERIC to allocate defined resources at the disposal of the EMBRC-ERIC (see below and Chapter 3, Governance).

Table 1. Capital investments by EMBRC partners. All figures in €.

Category	Funded 2013-17	Anticipated 2017-22
Research Vessels	10,200,000	2,600,000
Buildings and upgraded facilities	39,800,000	50,900,000
Equipment	6,200,000	16,300,000
Total	56,200,000	69,800,000

Table 2. The EMBRC central hub in the implementation phase (2014-16). All figures in €.

	2014-15	2015-16
Expenditure		
Staff Costs	210,700	212,800
Governance Meetings	117,000	117,000
Office Set Up & Running Costs	44,400	31,900
Activities	185,400	195,800
Total Expenditure	557,500	557,500
Income		
Subscription Income	180,000	180,000
Contribution from Host Country	400,000	400,000
Total Income	580,000	580,000
Surplus for Further Investment	22,500	22,500

4.2.2. The operational phase

The financial model for the operational phase is based on multiple funding streams including membership subscription fees, national and European public sources as well as the gradually increasing income from service delivery to and access fees from the private sector when using the EMBRC-distributed facilities. The share of income in the budget representing access is indicated to rise gradually from less than 30% to almost 45% during the first four years of the operational phase.

The estimated budget shown in Table 3 builds on the implementation phase. It assumes further employment of staff to undertake key roles including an Access Programme Administrator, a Knowledge Transfer and Innovation Officer and a Communications Officer (these roles are further explained in Annex 4), and provides indicative budgets for the activities. The salary and office costs will continue to be supported by annual membership income from member states. The remaining expenditure for activities will come from competitive funds from Horizon 2020 as well as structural and regional funds.

EMBRC-ERIC will provide access to distributed facilities and services. The marine stations and laboratories where the nodes are located are owned and/or operated by national operators

in the signatory member states (universities, research organisations or foundations). These national operators are themselves responsible for maintaining, updating and developing their infrastructure under EMBRC-ERIC access, which include both capital investment and running costs (staff and general management). Direct funding for this will have to be provided by research councils, national governments, regional authorities and the operators themselves.

EMBRC-ERIC will apply a common method and policy to cost and price service access in accordance with the "Full Economic Cost" model applied in the European Union. For each service offered at the node, a unit of access will be defined to measure the quantity of access provided for a particular service into EMBRC-ERIC. A unit of access is followed by a unit cost, which will serve to establish mechanisms for justifiable cost calculations, including direct costs and overheads, and will provide the basis for the price policy for access. This will form a transparent model of costs and funding streams. The unit cost will constitute the basis for setting the actual price level for academic and other users, but commercial users will be charged an "FEC+" depending on the market value of each service provided in EMBRC-ERIC.

The budget indicates an annual increase in expendi-

ture and income of between 8 and 9 %, allowing for a gradual growth in the number of signatory members and an expected increase in knowledge about EMBRC services among user groups. Depending on the actual level of activities, both the overall costs and the gross income from members and from services may have to be adapted.

This budget does not take into account the costs of the personnel dedicated to EMBRC at the nodes.

These will typically include the Liaison Officers, i.e. experienced administrators who will be the main link between the EMBRC-ERIC central hub and the nodes (see Chapter 3.1.). Table 3, however, partly accounts for these costs, as it is likely that at some EMBRC nodes, this type of staff will be employed from revenues of H2020 grants, structural funds and/or national funds targeted to the operation of EMBRC.

Table 3. The EMBRC-ERIC forecast budget for the operational phase from 2016 onwards. All figures in €.

	2016-17	2017-18	2018-19
Expenditure			
Staff Costs	495,656	503,069	512,131
Governance Meetings	200,000	211,000	217,000
Running Costs	52,350	47,500	47,350
Promotion, Marketing & Outreach	100,000	100,000	100,000
Joint Development Activities	2,000,000	2,060,000	2,160,000
Knowledge Transfer	400,000	400,000	400,000
International Co-operation	150,000	150,000	150,000
Training & Education	360,000	360,000	360,000
Help Aspiring Partners	75,000	75,000	75,000
Legal Support & Design Studies	50,000	50,000	50,000
Access	2,000,000	2,500,000	3,000,000
Total Expenditure	5,883,006	6,456,569	7,071,481
Income			
Contribution from Host Country	400,000	400,000	400,000
Subscription Income	600,000	660,000	760,000
Europe 2020	1,600,000	1,600,000	1,600,000
Regions	300,000	325,000	350,000
Member States, Research Councils (National Access)	500,000	500,000	500,000
Europe 2020 (Transnational Access)	1,500,000	1,750,000	2,000,000
Other Income Including Research Councils & Industry	1,000,000	1,225,000	1,500,000
Total Income	5,900,000	6,460,000	7,110,000
Surplus for Further Investment	16,994	3,431	38,519

5. Timeline

A draft of the Memorandum of Understanding (MoU) has been shared with the governments of current EMBRC Partners and is currently being finalised for signature. The preparatory phase of EMBRC will end in January 2014 and will be followed by an implementation phase (2014-2016). The two-year implementation phase will see the development of strategies for the EMBRC

core services, establishment of the EMBRC-ERIC governance structure and preparation of the nodes for receiving users. The operation of EMBRC-ERIC is planned to commence in spring 2016.

The following timeline gives a broad overview of the most important actions that will be taken to establish the EMBRC-ERIC.

Autumn 2013	<ul style="list-style-type: none"> • Negotiation of the Memorandum of Understanding (MoU) • Drafting of the EMBRC-ERIC Statutes
2014	<ul style="list-style-type: none"> • Signature of the MoU by the founding members • Establishment of the EMBRC Implementation Board • Decision on location of the EMBRC statutory seat and central hub • Preparation of recruitment of EMBRC Secretariat staff • Negotiation of EMBRC-ERIC statutes (incl. membership fees & voting rights) • Implementation of funding strategy (including preparation of applications for H2020 calls) • Submission of EMBRC-ERIC application to the EC according to the ERIC regulation • Set-up of EMBRC facilities & service database incl. negotiation of service-level agreements with EMBRC nodes
2015	<ul style="list-style-type: none"> • Establishment of joint development activities strategy and priorities • Set-up of EMBRC core activities (incl. knowledge platform strategy and procedure) • Official signed request of the hosting country to the European Commission to approve the EMBRC-ERIC • Establishment of the EMBRC Corporate Functional Organisation
Spring 2016	<ul style="list-style-type: none"> • Approval by the EC of the establishment of EMBRC as an ERIC foreseen • Preparation for the launch of EMBRC-ERIC operational phase: <ul style="list-style-type: none"> • execution of the service-level agreements • Approval of the EMBRC-ERIC budget • Launch of the EMBRC-ERIC operational phase

Abbreviations

AMPERA	European coordination action to foster prevention and best response to accidental marine pollution	www.cid.csic.es/ampera/index.php
ASSEMBLE	Association of Marine Biological Laboratories	www.assemblemarine.org/
AUV	Autonomous Operated Vehicle	
BiodivERsA	Network funded under the EU FP7 ERA-NET scheme	www.biodiversa.org
BMS	Biomedical Sciences	
BRC	Biological Resource Centre	
CBD	The Convention on Biological Diversity	www.cbd.int/convention/
CSA	Coordination and Support Actions	ec.europa.eu/research/fp7/understanding/fp7inbrief/funding-schemes_en.html
DG ENV	Directorate-General for the Environment of the European Commission	ec.europa.eu/dgs/environment/
DG MARE	Directorate-General for Maritime Affairs and Fisheries of the European Commission	ec.europa.eu/dgs/maritimeaffairs_fisheries/index_en.htm
EC	European Commission	
ESF	European Science Foundation	www.esf.org
EMBL	European Molecular Biology Laboratory	
EMBRc	European Marine Biological Resource Centre	www.embrc.eu
EMSO	European Multidisciplinary Seafloor Observatory	www.emso-eu.org/
ENPV	European Net Present Value	
ENV	Environmental	
ERA	European Research Area	ec.europa.eu/research/era/index_en.htm
ERA-Net	European Research Area Network	
ERIC	European Research Infrastructure Consortium	ec.europa.eu/research/infrastructures/index_en.cfm?pg=eric
ESFRI	European Strategy Forum on Research Infrastructures	ec.europa.eu/research/infrastructures/index_en.cfm?pg=esfri
EurOBIS	European Ocean Biogeographic Information System	www.eurobis.org
FACCE JPI	The Joint Programming Initiative on Agriculture, Food Security and Climate Change	www.faccejpi.com
FEC	Full Economic Cost	
FTE	Full Time Equivalent	
FP (6,7)	Framework Programme (6,7)	cordis.europa.eu/fp7/home_en.html
GB	Governing Board	

GMO	Genetically Modified Organism	
H2020	Horizon2020	ec.europa.eu/research/horizon2020/index_en.cfm?pg=h2020
I3	Integrated Infrastructure Initiative	
IP	Implementation Phase	
IUCN	International Union for Conservation of Nature	www.iucn.org
JPI	Joint Programming Initiative	ec.europa.eu/research/era/joint-programming_en.html
JPIAMR	Joint Programming Initiative on Antimicrobial Resistance.	www.jpiamr.eu
JPI Climate		www.jpi-climate.eu
JPI Oceans	Joint Programming Initiative for Healthy and Productive Seas and Oceans	www.jpi-oceans.eu/
KET	Key Enabling Technology	ec.europa.eu/enterprise/sectors/ict/key_technologies/
MarBEF	Marine Biodiversity and Ecosystem Functioning Network of Excellence funded under EU FP6	www.marbef.org
MarineBiotech	ERA-NET Preparatory Action in Marine Biotechnology	www.marinebiotech.eu
MG4U	Marine Genomics for Users; Project funded under EU FP7	www.mg4u.eu
Micro B3	B3 (Biodiversity, Bioinformatics, Biotechnology); Project funded under EU FP7	www.microb3.eu/home
MoU	Memorandum of Understanding	
OECD	Organisation for Economic Co-operation and Development	www.oecd.org
PharmaSea	Project funded under the EU 7 th Framework Programme; Focus on biodiscovery research of new substances from marine organisms	www.pharma-sea.eu
pp	preparatory phase	
R&D	Research and Development	
RI	Research Infrastructure	ec.europa.eu/research/infrastructures/index_en.cfm?pg=home
ROV	Remote Operated Vehicle	
RTD	Research and Technology Development	
SEAS-ERA	Project funded by the EU FP7 ERA-NET Scheme	www.seas-era.eu/
SME	Small and medium-sized enterprise	
UNCLOS	United Nations Convention on the Law of the Sea	
WAMS	World Association of Marine Stations	www.marsnetwork.org/wams.php

Glossary

ASSEMBLE (Association of Marine Biological Laboratories) is an EU FP7 research infrastructure initiative with a main focus on providing transnational access to a network of marine stations (The Sven Lovén Centre for Marine Sciences, Sweden; Scottish Association of Marine Science, UK; Station Biologique de Roscoff and Observatoire Océanologique de Banyuls, France; Stazione Zoologica Anton Dohrn, Italy; Centre of Marine Sciences, Portugal; Interuniversity Institute for Marine Sciences, Israel; Estación Costera de Investigaciones Marinas, Chile). Project period: 2009-2013.

Blue Growth is the long-term strategy to support sustainable growth in the marine and maritime sectors. It recognises that seas and oceans are drivers for the European economy with great potential for growth and innovation. Oceans, seas and coasts also play a vital role in tackling today's long-term challenges, such as globalisation, competitiveness, global warming, poverty and urbanisation. The main aim of Blue Growth is to provide policy makers with a comprehensive analysis of future policy options to secure smart, sustainable and inclusive growth from coasts, seas and oceans (EC Maritime Affairs, 2013: http://ec.europa.eu/maritimeaffairs/policy/blue_growth/; <https://webgate.ec.europa.eu/maritimeforum/content/2946>).

Blue Biotechnology involves the use of living organisms and bioprocesses from the sea, in engineering, technology and other fields requiring bio products (EC Maritime Affairs, 2013: <https://webgate.ec.europa.eu/maritimeforum/content/2946>; http://ec.europa.eu/maritimeaffairs/policy/biotechnology/index_en.htm).

The Convention of Biological Diversity (CBD) initiated in the world community's realisation of the need for the sustainable use and conservation of biological diversity. This global agreement became effective in 1993.

The **ERIC**, the European Research Infrastructure Consortium, was created in 2009 through a European regulation and is a dedicated legal framework to establish and operate research infrastructures

of pan-European interest. The regulation, (EC) No 723/2009, provides this new European venture with international organisation privileges (own procurement procedures) and excise duty and VAT exemptions under condition, together with full legal capacity in all EU countries. States and intergovernmental organisations can apply to set up an ERIC. Membership of an ERIC should include at least three member states.

The European Strategy Forum on Research Infrastructures (ESFRI) is a strategic instrument to develop the scientific integration of Europe and strengthen its international outreach. The competitive and open access to high quality RIs supports the quality of activities of European scientists and attracts the best researchers from around the globe (ec.europa.eu/research/infrastructures/index_en.cfm?pg=esfri).

Europe 2020 is the growth strategy of the European Union for the next decade. The EU's targets for becoming a smart, sustainable, and inclusive economy are employment, innovation, education, social inclusion and climate/energy.

Horizon 2020 (H2020) is the new EU Framework Programme for Research and Innovation in Europe running from 2014 to 2020 with a budget of over €70 billion. It aims at tackling the grand societal challenges of our time and secure Europe's global competitiveness.

A **model organism** is defined here as any marine species that is of common interest to the wider research community, society, or industry and is scientifically studied, often in culture, in a dedicated laboratory. Model organisms might be investigated, amongst others, to understand fundamental biological processes or discover new biological resources (e.g. novel genes, proteins, natural products).

Research Infrastructures (RIs) are facilities, resources or services of a unique nature that have been identified by European research communities to conduct top-level activities in all fields. This

definition of RIs, including the associated human resources, covers major equipment or sets of instruments, in addition to knowledge-containing resources such as collections, archives and data banks (ESFRI Strategy Report on Research Infrastructures, Roadmap 2010; ec.europa.eu/research/infrastructures/pdf/esfri-strategy_report_and_roadmap.pdf).

Smart specialisation is an approach to economic development through support to Research and Innovation. It will be the basis for Structural Fund investments in Research and Innovation as part of the Cohesion Policy's contribution to the Europe 2020 job and growth agenda (s3platform.jrc.ec.europa.eu/home).

The United Nations Convention on the Law of the Sea (UNCLOS) defines the responsibilities and rights of nations to use the world's oceans. It became effective in 1994.

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Annexes

I. EMBRC Partners

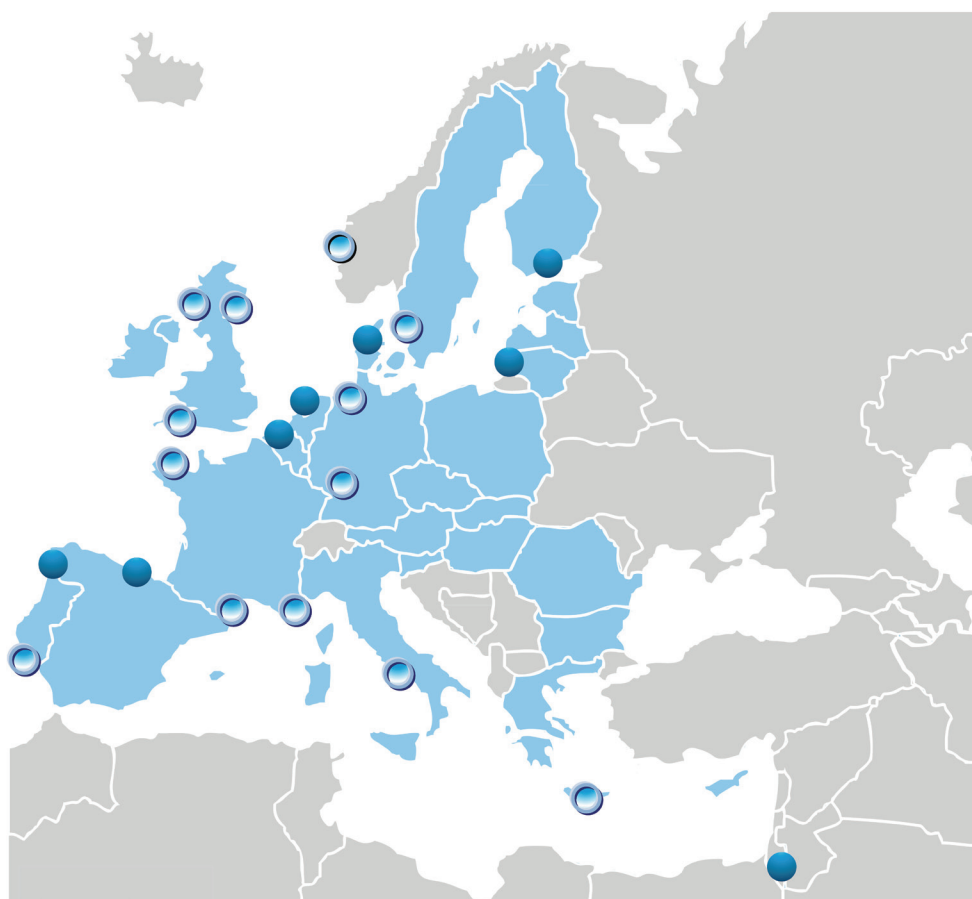


Figure 1. EMBRC Partners in the preparatory phase (Founding Partners: light blue; Associate Partners: dark blue).

Founding Partners	
France	National Center of Scientific Research and University Pierre and Marie Curie: Station Biologique de Roscoff; Observatoire Océanologique de Villefranche sur mer; Observatoire Océanologique de Banyuls sur mer
Germany	Alfred Wegener Institute for Polar and Marine Research
Greece	Hellenic Centre for Marine Research
Italy	Stazione Zoologica Anton Dohrn
Norway	UNI Research A/S
Portugal	Centro de Ciencias do Mar do Algarve
Sweden	University of Gothenburg: Sven Lovén Centre for Marine Sciences
United Kingdom	The Scottish Association for Marine Science. The University Court of the University of St. Andrews: Scottish Oceans Institute. Marine Biological Association of the United Kingdom

EU/ International	The European Molecular Biology Laboratory
Associate Partners	
Belgium	University of Gent. Vlaams Instituut voor de Zee (VLIZ): Ostend Marine Station
Denmark	Danish Shellfish Centre. Marine Biological Section (University of Copenhagen). Marine Biological Research Centre (SDU), Daneborg, Greenland. Marine Biology Station (Rönbjerg, Aarhus University), and Arktisk station, Greenland (University of Copenhagen)
Finland	University of Helsinki: Tvärminne Zoological Station
Israel	Interuniversity Institute of Marine Sciences in Eilat
Lithuania	Klaipeda Institut
Netherlands	Royal Netherlands Institute for Sea Research
Spain	Estación de Ciencias Mariñas de Toralla. Research Centre for Experimental Marine Biology and Biotechnology "Plentziako Itsas Estazioa"

2. Associate and Aspiring Partners

As part of preparatory phase EMBRC, several outreach workshops were held to inform other potential partner marine stations of EMBRC plans and proposals. Several of these expressed interest in joining the implementation phase and were considered to be Aspiring Partners. Criteria to join EMBRC were established (see Annex 3) and some of these

countries were selected to join the ppEMBRC partner activities, becoming Associate Partners: Belgium, Denmark, Finland, Israel, Lithuania, Netherlands and Spain. Other partners that may be invited to join EMBRC as soon as they fulfil the criteria are Poland and Russia. This possibility is open to other partners.

3. Criteria to join EMBRC

1. Countries with **European coastline**.
2. Marine stations or institutes in the countries above **providing access** to coastal marine biota and their ecosystems and/or research infrastructure, and that operate education, training and research programmes.
3. Those station(s) of the above that have **advanced research services**; for example, facilities for genomics, advanced imaging technology, climate control rooms and experimental facilities, aquaria and culture/maintenance facilities for marine organisms, local accommodation for visiting scientists.
4. Any **specialisation** such as a particular service or key ecosystem should also be taken into account. Some redundancy would be acceptable (for example that bioinformatic services exist in several stations), but there should be differentiation and areas of added value.
5. Failure to meet one of the criteria above does not automatically result in exclusion, i.e. an institute with a weak point can be allowed to improve on this point within EMBRC.
6. Partnership is at the country level. If there are several marine **stations/institutes in a country**, then they should coordinate between themselves agreeing on a suitable mode of membership.
7. National support and **national and/or regional funding** is required to become part of the EMBRC construction phase.
8. Associated countries, third countries and intergovernmental organisations must recognise the legal personality and capacity of EMBRC-ERIC.

4. Governance: Duties and tasks

EMBRC Governing Board

- Acts as the body having decision-making powers regarding EMBRC strategies and governance
- Approves the general strategy and scientific development
- Adopts the annual budget
- Approves the annual activity report to be submitted to the EC
- Appoints the EMBRC-ERIC Director, members of the Ethical board and any other positions required within any of the EMBRC governing body
- Approves the admittance to partnership of the interested parties in EMBRC, according to the Statutes
- Terminates the membership of any member that violates or contravenes its Statutes

Voting rights: One country – one vote

EMBRC-ERIC Director

- Reports to the GB
- Prepares and implement the decisions of the GB
- Leads the EMBRC-ERIC Secretariat, which will support his/her tasks
- Employs staff working in the EMBRC Secretariat according to the EMBRC Human Resources Plan and EMBRC Equal Opportunities Plan

EMBRC-ERIC Secretariat

- Ensures that the decisions of the ERIC are implemented
- Provides EMBRC European services
- Manages the link between the local services and the European level
- Ensures openness and fairness of access to EMBRC services
- Oversees the quality and long-term sustainability of the services
- Promotes the infrastructure to its various users and financial partners
- Organises training courses for staff and users
- Facilitates access clearance to biomaterial and knowledge transfer

Staffing of Secretariat in implementation phase

Secretary

The Secretary will be the principal provider of administrative support for the EMBRC Implementation Board. He/she will support the EMBRC Secretariat in taking phone calls, managing and maintaining the Secretary agenda, drafting correspondence, writing minutes during meetings and looking after visitors. Where appropriate, the Secretary will also provide organisational support for preparing and running meetings and events.

Financial Manager (half-time)

Responsibility for all EMBRC financial activities, such as financial planning, analysis, control, accountancy, procurement, reporting and financial recommendations. In addition, the Financial Manager will play a crucial role in advising the EMBRC Secretariat on short-term and medium-term financial objectives, actions and funding proposals. The Financial Manager will also advise on interpretation and implementation of the ERIC financial procedures and ensure compliance with EU/ERIC guidelines.

Legal Officer (half-time)

Responsible for drafting and negotiating the terms of reference and the service-legal agreements for the functioning of EMBRC. The Legal Officer will monitor the negotiation of the EMBRC-ERIC statutes with the interested countries and prepare the application to the European Commission. She/he will liaise with legal departments of the national operators and the competent ministries.

Staffing of Secretariat in operational phase

(All positions are full-time)

Secretary

As above

Financial Manager

As above

Legal Officer

Responsible for drafting, negotiation and

interpretation of the legal agreements regulating EMBRC-ERIC activities and services. The legal officer will provide legal advice to EMBRC staff and users to ensure that all services and activities are rendered according to the legal standards. She/he will liaise with legal departments of the national operators and the competent ministries.

Access Programme Administrator

The Access Programme Administrator will develop and implement the EMBRC Access Programme strategy and the organisation of access calls. Additional responsibilities include ensuring the smooth running of the access programme, education and training, the compilation and curation of user access data and databases (for customer satisfaction monitoring) and contact with applicants and users.

Knowledge Transfer and Innovation Officer

The Knowledge Transfer and Innovation Officer will plan, design and implement the EMBRC knowledge management and innovation strategies. The position will also manage the EMBRC Knowledge and Intellectual Property portfolio and implement activities regarding the Knowledge Triangle (research, education, innovation). A key function will be to identify knowledge transfer training needs and to plan, develop and facilitate productive and growing relationships with other EU-funded projects, academia and the private sector.

Communications Officer

The Communications Officer will be responsible for developing and implementing the EMBRC promotion, communication and outreach strategy. This will include the implementation of strategies to disseminate EMBRC and reach new target users. Also of key importance will be networking activities with sister RIs and EU representatives, and functioning as the contact point for EMBRC and maintaining the EMBRC presence through social media and the press.

EMBRC Liaison Officers

- Coordinate EMBRC activities and services at the node and liaise with the EMBRC-ERIC Director, his/her staff and the marine station/institute director
- Coordinate execution of EMBRC tasks at the node level
- Promote EMBRC locally
- Engage with the local/regional academic users and industry
- Attend local meetings, conferences and trade fairs where appropriate
- Provide information, statistics and updates from the node for EMBRC-ERIC Secretariat
- Provide infrastructure and service information for the EMBRC service database
- Prepare the node information for the biennial EMBRC Services Review
- Provide news, success stories and promotional material for the EMBRC-ERIC Secretariat from the node

Additional duties during the implementation phase

- Host EMBRC open days for academics and industrial users

Additional duties during the operational phase

Access duties

- Be the contact person for visiting users and responsible for smooth service provision on-site
- Facilitator for local administration and permits for research (if required)
- Knowledge transfer interviews at the end of visits: determine possible uses and targets of the research conducted to be fed into the centralised EMBRC Secretariat knowledge transfer database and forward additional user feedback

5. Financial plans: Breakdown of capital investment

Table 1. Breakdown of capital investment by category. All figures in k€.

Infrastructure	Funded	Unfunded	Total
Aquaria and culture	5547	12375	17922
Research vessels	10200	2617	12817
Marine instruments	1560	150	1710
Scientific diving	400	500	900
Imaging and microscopy	2900	5455	8355
Molecular platforms	5150	13640	18790
e-infrastructure	1295	9575	10870
Accommodation	12800		12800
Special facilities	16336.5	25500	41836.5
			126000.5

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