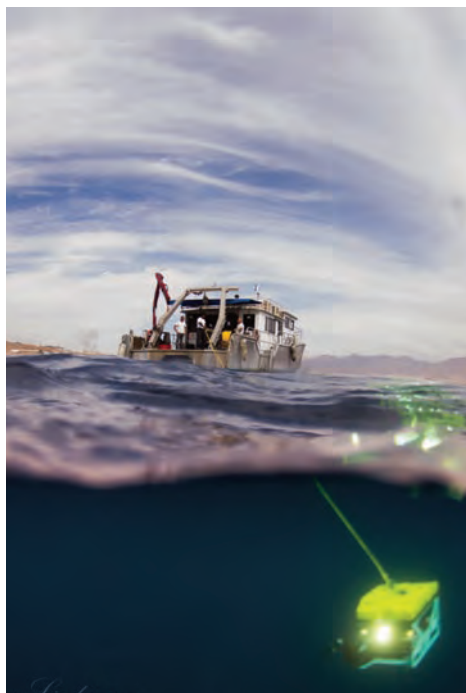
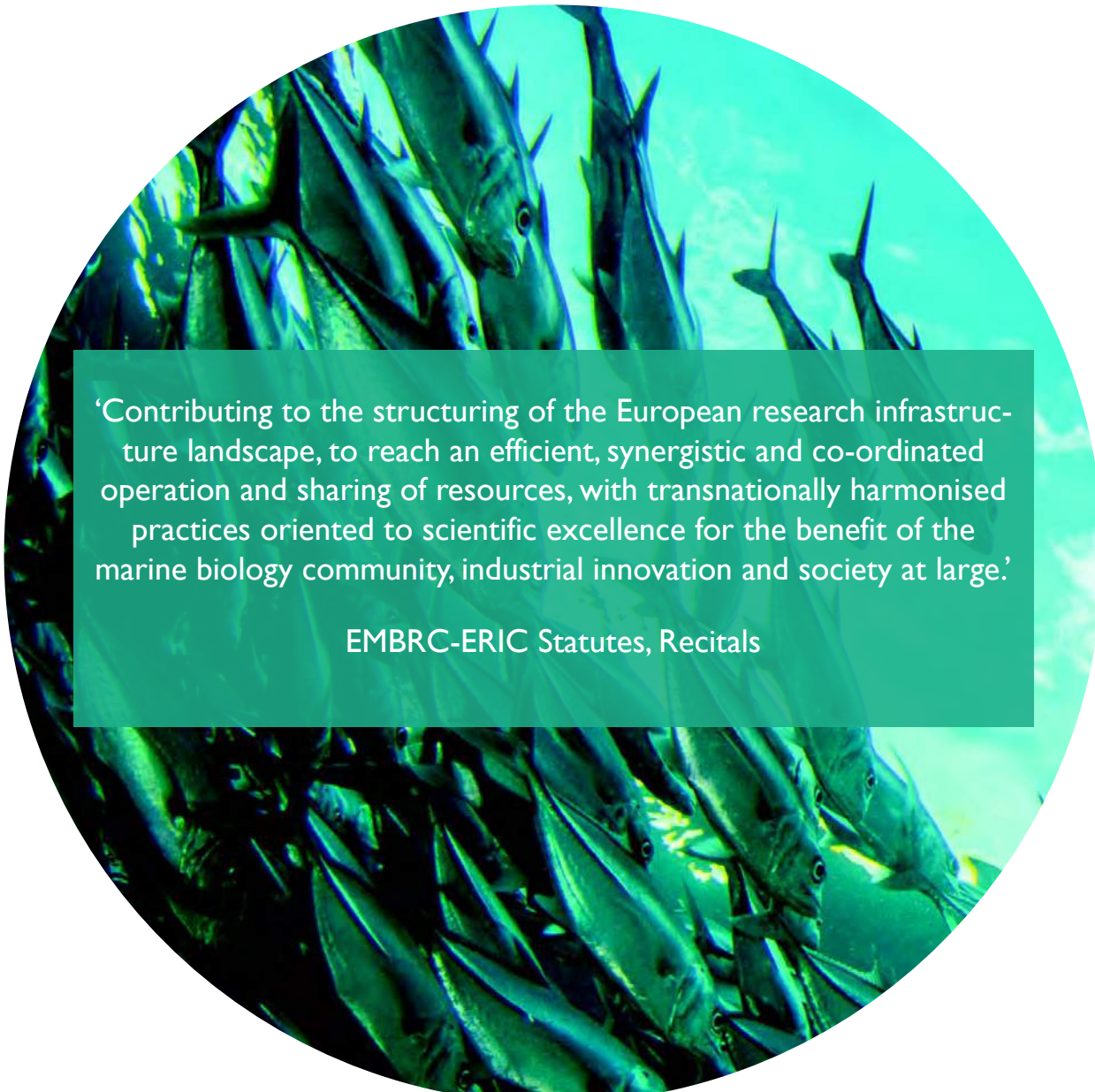




**EMBRC**  
EUROPEAN  
MARINE  
BIOLOGICAL  
RESOURCE  
CENTRE

# EMBRC-ERIC Annual Report 2019





‘Contributing to the structuring of the European research infrastructure landscape, to reach an efficient, synergistic and co-ordinated operation and sharing of resources, with transnationally harmonised practices oriented to scientific excellence for the benefit of the marine biology community, industrial innovation and society at large.’

EMBRC-ERIC Statutes, Recitals

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## I. FOREWORD

I am pleased to present the very first Annual Report of EMBRC-ERIC. The following pages describe our activities and progress throughout 2019. Our mission is to support excellent science and innovation through the sustainable use of marine biological resources, in support of the European Blue Bioeconomy. We continue to pursue this mission diligently, striving to improve user access and to evolve our services.

This has been a challenging year for EMBRC with many changes and developments, starting with the arrival of a completely new team at the central hub in Paris. This top-to-bottom change has injected fresh energy and thinking into the running of the ERIC. However, it also leaves an experience and knowledge gap that will take time to fill. Luckily, with an eclectic mix of veterans and young talent, the new team is approaching our challenges from fresh angles and breathing new life into the RI.

As a European research infrastructure, we have the responsibility to support our research communities in all of their activities, which means evolving to changing needs and demands, as well as looking to the future to identify the main challenges ahead. Together with the Committee of Nodes, we have prepared a new science strategy for EMBRC, reflecting the challenges and strategic priorities in Europe over the coming years. Amongst



our biggest challenges is the implementation of a Genomics Observatory across our network. In addition, increased attention on the oceans has highlighted a lack of biodiversity monitoring, and EMBRC will seek to rectify this. This presents a unique challenge as we move from a purely experimental RI to one that embraces observation and data access. On a more applied front, we will be looking to improve our support of bioprospecting in Europe. This is a highly important activity in the bioeconomy and the biotechnological sector, which EMBRC is well placed to support through its extensive expertise on marine organism culture. We will also continue to develop our existing marine organism expertise through increasing collection and model organism diversity, introducing taxonomic identification services and improving cryopreservation abilities.

Beyond our future strategy, we have been working to consolidate our nodes, strengthening their structure and organisation, and clarifying expertise and services offered by our operators. In turn, this strengthens the structure and organisation of EMBRC as a whole, as well as providing users with a clear overview of services. We are also finalising our Rules of Operation and drafting Service Level Agreements with our nodes, which will be the final steps in completing the set-up of EMBRC-ERIC.



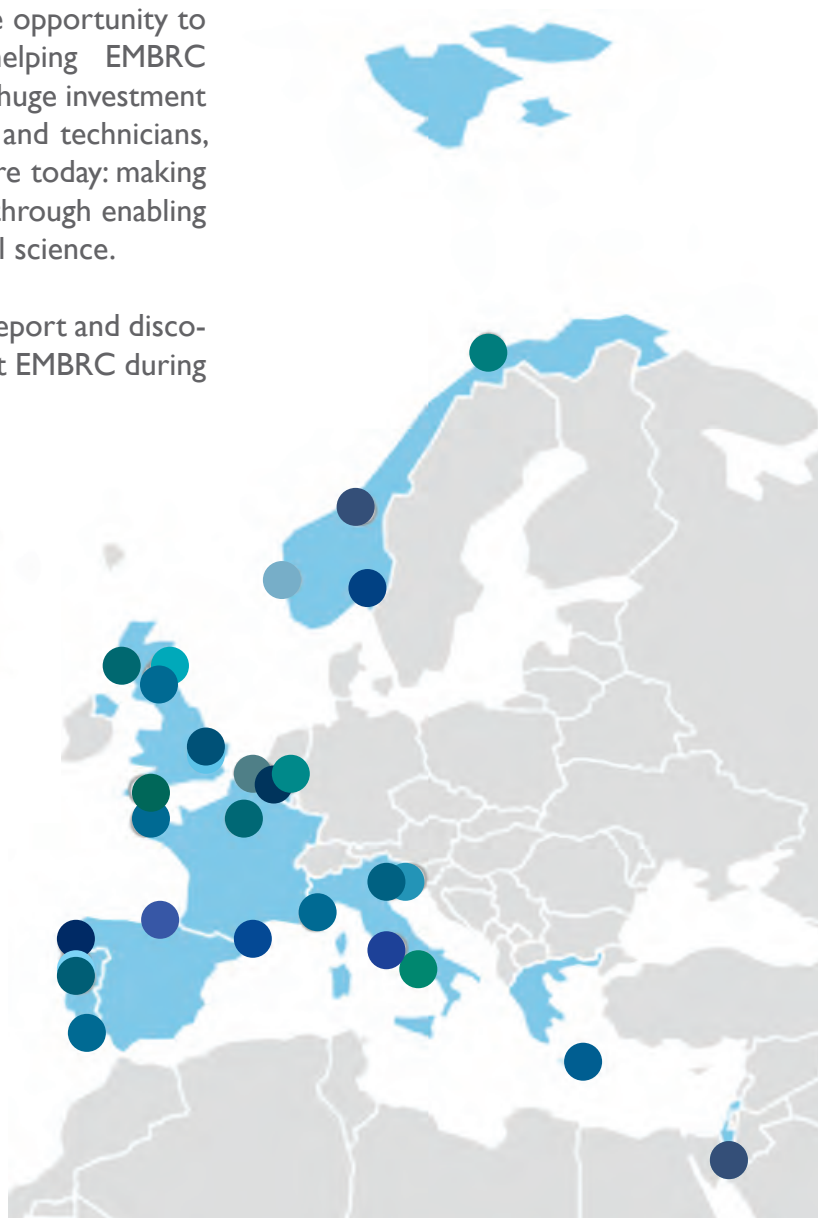
The success of EMBRC depends, to a large extent, on the user community, and thus we have been working to improve the access mechanisms to our facilities and services. A new guidelines document aids local access and liaisons officers in the handling of users to provide the best possible service. We are implementing, as far as possible, extensive user engagement to ensure we can accommodate any experimental set-up and to facilitate user experimental optimisation. At EMBRC we strongly believe in providing excellent services, and I am proud to say that our user satisfaction remains extremely high!

Finally, I would like to take the opportunity to thank everyone who is helping EMBRC become a reality. Without the huge investment of our members, committees and technicians, we would not be where we are today: making a difference to our discipline through enabling exciting, relevant and impactful science.

I hope you enjoy reading the report and discovering what else has evolved at EMBRC during 2019.



Nicolas Pade  
Executive Director



EMBRC partners

## 2. INTRODUCTION

Europe's research infrastructure for marine biological resources, EMBRC, entered the ESFRI Roadmap in 2008. After 10 years and two preparatory phase projects EMBRC established its European Research Infrastructure Consortium (ERIC) in June 2018, which signalled the onset of the operational phase.

EMBRC was set up to:

- a. promote and deliver on new scientific discoveries and deepen knowledge of marine organisms and ecosystems;
- b. promote the use of marine experimental models in mainstream science and raise the profile of marine biological sciences;
- c. promote the sustainable utilisation of marine biological resources;
- d. promote the European blue bio-economy

EMBRC is a member of the Food & Health Research Infrastructures group, through our provision and development of important experimental research models, but also serves an important environmental and ecological research community.

The founding member countries comprise of Belgium, France, Greece, Israel, Italy, Norway, Portugal, Spain, and the United Kingdom. The RI is governed by its General Assembly (see organigramme, Figure 1), composed of a scientific and a governmental representative from each member state. The GA relies on its executive director (ED) to implement and action their decisions. A Science and Innovation advisory Board and consultative Committee of Nodes facilitate the implementation of EMBRC at the national level, supporting the ED. The ERIC is managed from its headquarters at Sorbonne University in Paris, France.

Today EMBRC is a distributed Research Infrastructure, with 32 sites across 9 European countries, from the Arctic to the tropics. We provide access to marine ecosystems and biodiversity, as well as the facilities for studying them, to users from academia, industry, tech-

nology, and education. The EMBRC investigation capacity and capability covers the whole range of marine biodiversity, using approaches ranging from molecular biology to ecology, chemistry, and integrative biology. EMBRC key thematic areas include marine biodiversity and ecosystem function, developmental biology and evolution, marine products and resources – biotechnology, aquaculture, fisheries – and biomedical science.

EMBRC member states are organised into Nodes, comprising one or more Operators (Table of Operators, Figure 4). Each node is established as a national infrastructure, ensuring that the national interests are covered. Each service site also brings to EMBRC its own unique expertise and infrastructure, ranging from functional genomics expertise on specific model organisms, bioprospecting, algae culture, and aquaculture facilities, to large scale mesocosms, plankton taxonomy, biodiversity assessment, and marine mammal experimental facilities. This ensures that EMBRC can cater for a broad range of research topics, making us a research infrastructure with impact on a broad range of disciplines.

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## 2. 1. ORGANIGRAMME

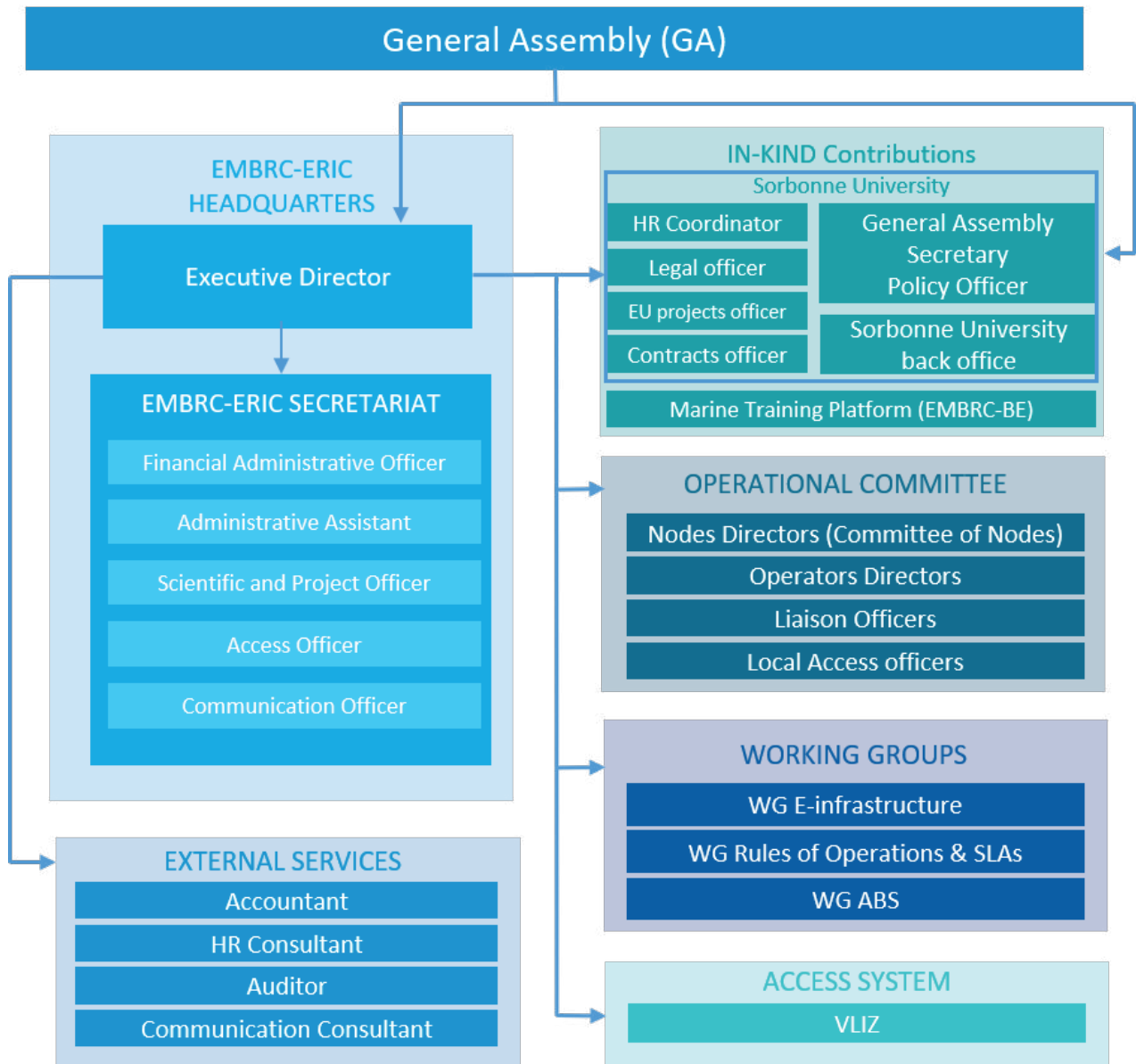


Figure 1: EMBRC organigramme



## 2.2.ACCESS WORKFLOW



Figure 2: EMBRC access workflow



## 2.3. EMBRC SERVICES

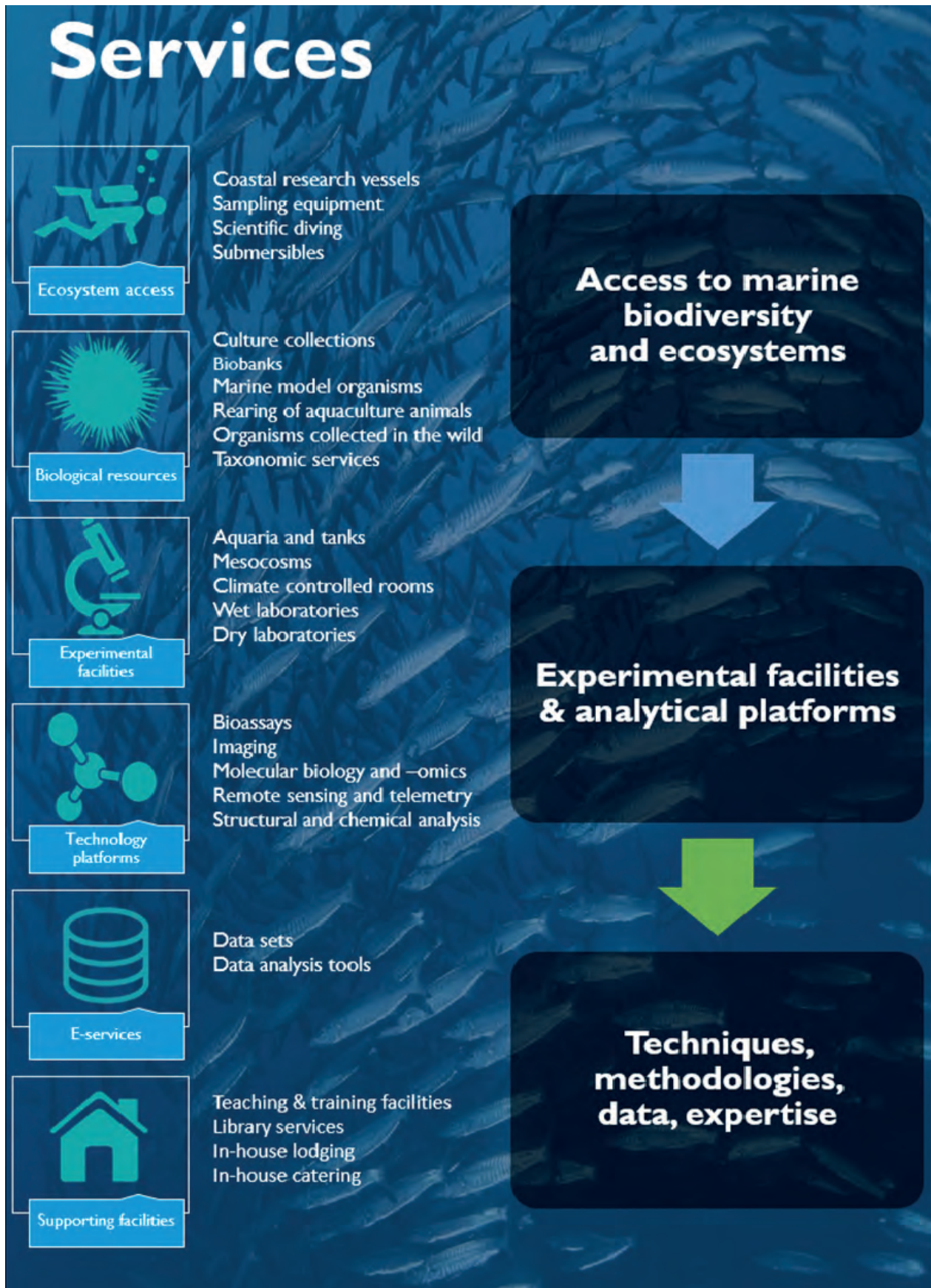


Figure 3: EMBRC services

## 2.4. TABLE OF OPERATORS

Node	Operator	Acronym	City
Belgium	Ghent University	UGENT	Ghent
	Flanders Marine Institute	VLIZ	Oostende
	Royal Belgian Institute of Natural Sciences	RBINS	Brussels
	University of Hasselt	UHasselt	Hasselt
	Katholieke Universiteit Leuven	KU Leuven	Leuven
France	Sorbonne Université (Operator) & CNRS	SU	Paris
	Institut de la Mer de Villefranche (Service site)	IMEV	Villefranche-sur-mer
	Observatoire Océanologique de Banyuls sur Mer (Service site)	OOB	Banyuls-sur-mer
	Station Biologique de Roscoff (Service site)	SBR	Roscoff
Greece	Institute of Marine Biology, Biotechnology and Aquaculture, Hellenic Centre for Marine Research	HCMR-IMBBC	Crete
Israel	Interuniversity Institute for Marine Sciences	HUJI	Eilat
Italy	Stazione Zoologica Anton Dohrn	SZN	Napoli
	Istituto per le Risorse Biologiche e le Biotecnologie Marine	CNR-IRBIM	Messina
	Istituto di Scienze Marine	CNR-ISMAR	Venezia
	Consorzio Nazionale Interuniversitario per le Scienze del Mare	CONISMA	Rome
	National Institute of Oceanography and Experimental Geophysics	OGS	Trieste
Norway	University of Bergen	UIB	Bergen
	Institute of Marine Research	IMR	Bergen
	University of Oslo	UIO	Oslo
	Norwegian Institute for Water Research	NIVA	Oslo
	The Arctic University of Norway	UIT	Tromsø
	Nofima	Nofima	Tromsø
	Norwegian University of Science and Technology	NTNU	Trondheim
Portugal	Centre for Marine Sciences	CCMAR	Faro
	Interdisciplinary Centre of Marine and Environmental Research	CIIMAR	Matosinhos
	Institute of Marine Research	IMAR	Horta
	Coimbra Collection of Algae	ACOI	Coimbra
Spain	Toralla Marine Science Station – Vigo University Marine Research Centre	ECIMAT-UVIGO	Toralla
	Plentzia Marine Station	PIE-UPV/EHU	Plentzia
United Kingdom	Marine Scotland	MSS	Aberdeen
	The Marine Biological Association	MBA	Plymouth
	Natural Environment Research Council – British Antarctic Survey	NERC	Cambridge
	Scottish Association for Marine Science	SAMS	Oban
	Scottish Oceans Institute	SOI	St. Andrews
	Marine Alliance for Science and Technology for Scotland	MASTS	St. Andrews

Figure 4: EMBRC Operators

### 3. POSITIONING EMBRC-ERIC

The priority in 2019 was to reinforce the scientific position of EMBRC, making it clear to our user communities and stakeholders what they can expect from the RI in the next three to five years. To this end, a science strategy was developed, covering Biodiversity Monitoring, Characterisation, and Taxonomy; Domestication of Marine Species; Post-Genomic Tools; and New Experimental Systems. With this ambitious strategy, EMBRC is embarking on a new route, aiming to deploy a genomics observatory, strengthen bioprospecting and taxonomy expertise, developing new model organisms, tools to manipulate them, and the deployment of new, large-scale, experimental facilities. In order to further engage with the user community, EMBRC attended, for the second year running, the Euromarine General Assembly and the European Marine Biology Symposiums. These events bring together a significant component of our user community and present great opportunities for promoting EMBRC.

We continued to work closely with our cognate RIs in the Food & Health Domain, and in the Environment Domain. The principle avenues for interaction are the respective directors groups, Life Sciences RI (LS-RI) and the Board of European Environmental Research Infrastructures (BEERi). Numerous meetings were attended in person, or virtually, with the LS-RI, discussing, among other things, how to engage with the EC on Horizon Europe and the Missions. However, it is also an opportunity to discuss collaborations amongst individual RIs. EMBRC was approached by EuroBioImaging (EUBI) to sign a collaboration agreement, based on the strong links between the two RIs in the CORBEL project. This was, however, put on hold until the new governing structure of EUBI is fully implemented. BEERi was also attended on two occasions, where the main topic of discussion was the establishment of the ENVRI group as an entity, its eventual governing structure and purpose. Nonetheless, extensive discussions were had



with LifeWatch-ERIC about furthering collaborations, building on the existing synergies established in the ASSEMBLE Plus project. Also of significance is the invitation of the EMBRC executive director to participate in the JERICO 3 advisory board, a structure that has ambitions of becoming a coastal observation RI.

EMBRC had planned to start developing its industry and policy engagement in 2019, two topics intricately linked due to their shared regional dimension. However, this has not been developed further at this point as a working group is being set up to aid all operators in successfully engaging with their regional governments and innovation ecosystems. For this to work, there also needs to be a full communication strategy in place at EMBRC, which has not been possible in 2019 due to the lack of communication officer (see page 13, Communication).

The Nagoya Protocol and Access and Benefit Sharing legislation are topics of huge importance to any structure providing access to wild type and collected biological resource. EMBRC identified this as an important topic early on, yet has never had the resources to properly implement this or be an important player in negotiations. Nonetheless, the RI possesses excellent skills and knowledge on this topic

and has been invited to several meetings in 2019 to provide input, particularly on the impact of this legislation on research and researchers. We are thus still in a position to influence and be a stakeholder in these ongoing discussions. With the funding of the EOSC-Life project, EMBRC will also receive human resources to work on this topic and we are expecting to make significant advances in making EMBRC compliant with the ABS framework, an absolute necessity for a European RI, in 2020.

Finally, EMBRC took its first steps onto the global stage with the hosting of the EU-LAC (European exchange programme with Latin

America and the Caribbean) in EMBRC-PT in March. Delegates from universities and research laboratories in Chile, Panama, Uruguay, and Honduras visited the EMBRC site at CCMAR in the Algarve and heard presentations on how EMBRC operates and coordinates activities across Europe. Excellent exchanges and ideas for collaboration were established, whilst it was also recognised by the visitors that the same level of organisation would be extremely challenging at this point in Latin America. Nonetheless, there is willingness to continue to exchange and work together and we are currently seeking an appropriate call for submitting a joint project.

EU-LAC visit to EMBRC-PT



## 4. COMMUNICATION & DISSEMINATION

Communications had been identified as a high priority for EMBRC, to raise its visibility and commence strong promotion of our services and platforms. Two calls for candidates for the post of EMBRC Communication Officer (CO) were carried out in the first half of 2019, with a large number of high-quality candidates applying for the post. Multiple candidates were interviewed and offers were made to 4 candidates in total, which went as far as the contract negotiation stage. Unfortunately, every candidate ultimately rejected the offer made, citing difficulties of relocating family to France. A third call for candidates was launched at the end of 2019 with the aim of securing a communication officer in the first quarter of 2020.

The failure to recruit a CO meant that a number of goals — including website design, communication strategy and brand material —

were not established, leaving the communication targets of EMBRC largely unfulfilled for 2019. To avoid a complete silence on the EMBRC communication channels, the EMBRC Project Manager took over essential communication duties, and social media platforms and the website were maintained as priorities.

Three articles related to EMBRC were published by Open Access Government, which EMBRC was contractually obliged to deliver. In addition, EMBRC has, for the second year in row, sponsored the European Marine Biology Symposium (EMBS). Held in Dublin in August, EMBRC had a booth where material on EMBRC, ASSEMBLE Plus and MarineTraining were shared. This event has been a great platform for promoting EMBRC and the ASSEMBLE Plus project's Transnational Access Programme.



## 5. ACCESS & SERVICE DEVELOPMENT

One of the core activities of a Research Infrastructure is to provide access to its research services. To fully comply with this mission, in June 2019 the HQ was staffed with an Access Officer in charge of managing the access provision and to follow the integration and update of the EMBRC-ERIC services on the EMBRC-ERIC web portal. Guidelines for the access to EMBRC were defined during a workshop with liaison and local access officers, as well as establishing performance indicators for the services provided by EMBRC. Efforts jointly made with other European Research Infrastructures in cluster projects (such as CORBEL, EMBRIC) helped to define “pipelines” for research in transnational fields (marine biotechnology, services for life sciences) very likely to be included as permanent offer of EMBRC and other RIs as a set of integrated services for the scientific community.

### 1. Define EMBRC nodes service offers

The catalogue of EMBRC services built during the preparatory phase of EMBRC (pp2EMBRC) has been revised and updated for the transnational access programme of the ASSEMBLE Plus project. This update has achieved two main outcomes: the revision of the nomenclature of the EMBRC services catalogue; and the update of the descriptions of the EMBRC services, now more informative and user-friendly. These actions are allowing prospective users to orient themselves in finding services corresponding to their needs; adjust their expectations; and maximise the outcomes obtained during the access, and will be transferred to the EMBRC access system.

EMBRC services will be framed to show the unique specialisations available at a given Operator (e.g. a phytoplankton taxonomy service coupled with light microscopes). This “contextual information” will show the added value of the expertise present at site level and will help users to make a more informed selection of different Sites offering similar facilities.

These updates, together with the lessons learned with user feedback in ASSEMBLE Plus, are helping to offer a made-to-measure approach to scientists interested in using EMBRC services for their research projects.

### 2. Redefine EMBRC Access

#### 2.1. Describe access protocol, including review procedures

Node representatives and local access officers gathered together in October 2019 for the first workshop on EMBRC access to define the guidelines for the access to EMBRC. One of the major points of the workshop was to shift the focus of the EMBRC service provision to a “made-to-measure” approach, prioritising the support of local access officers during the discussion with the prospective users. The aim is to ensure that EMBRC can tailor its services to user needs. The workshop helped to define guidelines to access EMBRC, indicating objectives, methods and other procedures such as: the access request workflow; roles and responsibilities of liaison and local access officers; on-site and remote access issues; review procedures in case of market-driven or excellence-driven access requests; nomenclature of services and their relationships; definition of the unit of access for each service category; collection of user statistics; and Key Performance Indicators (KPI, see point 5, page 16).

#### 2.2. Create national entry points through node websites

While the delayed launch of the new EMBRC-ERIC website has postponed the integration of access to Node services, the needs of a revised access system and its necessary characteristics (such as nodal and inter-nodal access) were defined during the first workshop on EMBRC access, with different options for the access system under evaluation. The objective is to create a link from the national websites directly to the EMBRC application system, thus linking the national websites to the access portal.

So far, the web-based system ARIA has provided a successful experience in different access programmes (CORBEL, EMBRIC and ASSEMBLE Plus) and means that this system is suitable for EMBRC needs. In addition, EMBRC has been invited by INSTRUCT-ERIC (owner and developer of ARIA) to join a “user group” to contribute and suggest features and other functionalities for its further development. A final decision on the adoption of ARIA for EMBRC-ERIC will be taken in early 2020.

### 3. Identify pipelines to maintain and develop between EMBRC and cognate RIs

The work conducted in the cluster projects CORBEL (services for life sciences) and EMBRIC (blue biotechnology) offered a framework within which to develop and test “research pipelines”. Pipelines are connected sets of services that enable users to exploit expertise and facilities offered by European Research Infrastructures working in different areas of research or scientific domains.

Whilst the establishment of pipelines in CORBEL and EMBRIC served for testing the interconnectedness and interoperability of services through different European Research Infrastructures (figure 5), it also offered the chance to highlight which services are used more frequently by researchers.

The “microalgae pipeline”, designed in the EMBRIC project through a collaboration between EMBRC and EU-OPENSOURCE, has been the most used by researchers within its Transnational Access programme. This pipeline allowed users to study novel and unexplored metabolites, with potential applications in the pharmaceutical, cosmetic or nutraceutical industry. Other pipelines developed in EMBRIC for the Blue Biotechnology field are available at <http://www.embric.eu/access/-TA/pipelines>.

A collaboration among partners of EMBRC, EUROBIOMAGING and ELIXIR allowed the design of the pipeline for research in “Marine

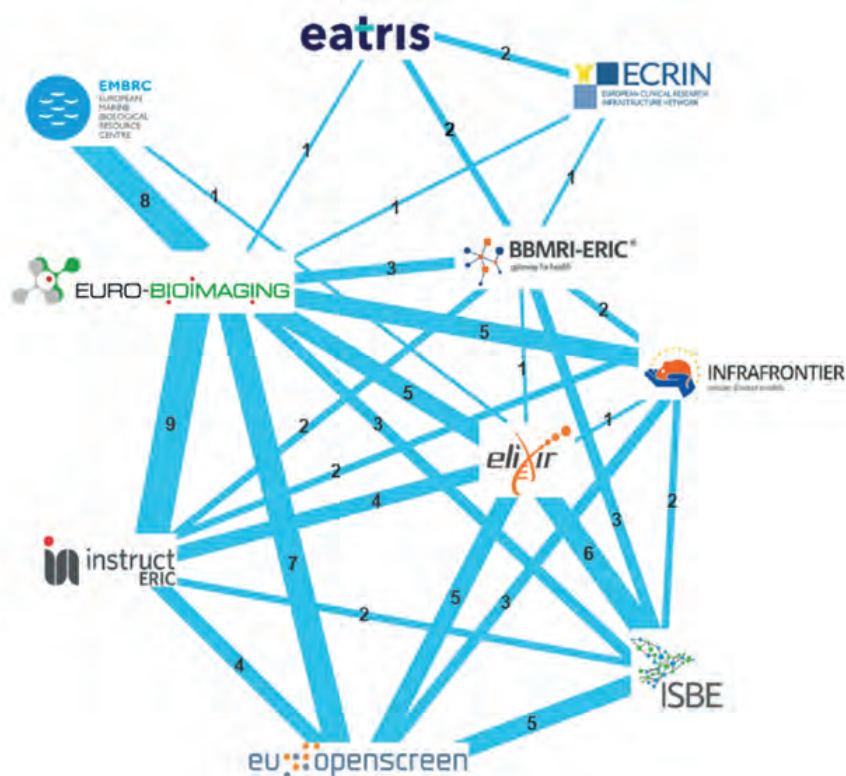


Figure 5: The most frequent combination of RIs in the project CORBEL. The numbers and thickness of the lines indicate the frequency of their request. The combination of marine organisms and microscopy was the second most requested service combination. (Image taken from CORBEL Deliverable 4.2 “User access to common RI services”)

metazoan developmental models for biomedical research”. This pipeline has been one of the most used in CORBEL and provided understanding of biological mechanisms underlying disease, through the use of marine model organisms, more diverse and experimentally accessible than traditional animal model species.

The connections established by EMBRC with EU-OPENSREEN, EuroBioImaging and ELIXIR will need to be maintained through the establishment of agreements with these RIs.

#### **4. Redefine the perimeter of the EMBRC e-infrastructure and data offer**

EMBRC-ERIC is re-evaluating its data and e-infrastructure offer to ensure that it fits with the general mission of EMBRC and to avoid unnecessary duplication or infringement on services provided by other Research Infrastructures. EMBRC is not an e-infrastructure and therefore needs to be selective about its service offer. It is therefore clear that services around data storage, data treatment (e.g. virtual research environments), and data analysis are not in the realm of EMBRC.

In order to provide practical guidance and expert advice on e-infrastructure and data matters, the Working Group on e-infrastructures has been reactivated and joined by data experts from several other EMBRC Operators. The e-infrastructure Working Group is paying attention to the strategic development and advice on EMBRC activities and their data policies.

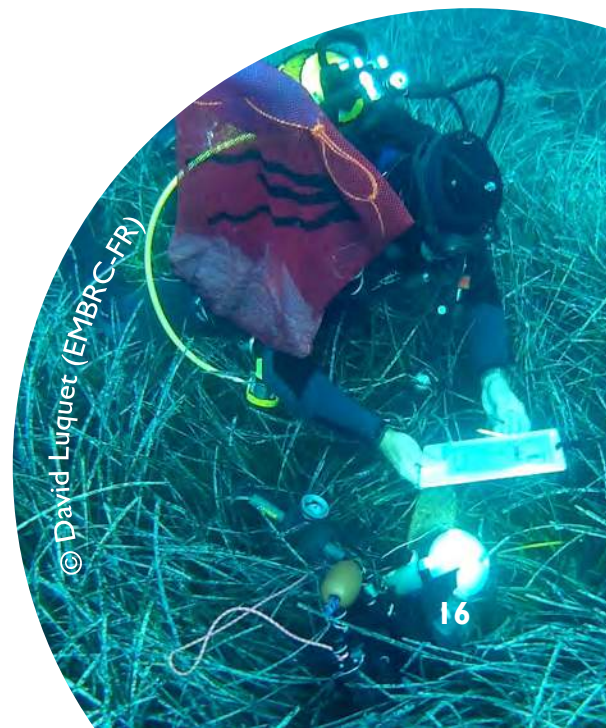
The group met twice (once in person and once via teleconference) and discussed several topics, including: how to handle data obtained in Long Term Ecological Research from EMBRC stations, part of either EMBRC and other LTER initiatives; and recommendations on how to make FAIR (Findable, Accessible, Interoperable and Reusable) data coming from

the Genomic Observatories and Ocean Sampling Day initiatives. In this context, the support from the ASSEMBLE Plus and EOSC-Life projects has been essential to the development of specific tools for this scope (e.g. Data Management Plan) and to the role of EMBRC in a funding proposal in the Open Science project “OpenAIRE”. In this proposal, EMBRC will serve as a test case for an aggregated web-based dashboard making available scientific publications obtained through the use of EMBRC services or funding.

#### **5. Deploy common indicators across the nodes**

The performance and the impact of the European Research Infrastructures need to be measured to provide a useful management tool to the RI governance and for policy making decisions by funding bodies. These objectives led the European Strategy Forum on Research Infrastructures (ESFRI) to create a Strategic Working Group to develop an approach for monitoring the performance of Research Infrastructures through the use of Key Performance Indicators (KPIs). The ESFRI Strategic Working group finalised the set of KPIs in December 2019 in the document “Monitoring of Research Infrastructures Performance ”.\*

\*[https://www.esfri.eu/sites/default/files/ESFRI\\_WG\\_Monitoring\\_Report.pdf](https://www.esfri.eu/sites/default/files/ESFRI_WG_Monitoring_Report.pdf)





EMBRC, as a Landmark Research Infrastructure, has already begun to adopt KPIs and other metrics (figure 6) for evaluating the access of its services, in particular regarding the number of access requests received and users served, professional status of the users, home institute type of the users (academia, universities, Small and Medium Enterprises, private sector), etc. The guidelines for access to EMBRC (to be approved in early 2020) will provide a common framework for EMBRC Operators to measure the quantity of access provided by their services. The full implementation of KPI is foreseen for mid-2020.

### 6. Trends in the access

EMBRC services have been utilised by a large community of users. Most of them have taken advantage of funding opportunities for access offered by “transnational access” programmes (ASSEMBLE Plus, CORBEL). These programmes have supported researchers in carrying out research projects using platforms and marine biological resources not available in their home institute countries.

#### *a. User requests for access*

EMBRC has received a total of 267 access requests: the large majority of requests (220) came from researchers from institutes of European countries (ESFRI or ESFRI-associated), mostly from Belgium, Great Britain, Italy and Germany (fig. 6); other requests (47) came from researchers based in other countries (non-ESFRI), notably from USA (9), Argentina (4) and China (5). Requests came in prevalence from researchers based at academic institutions such as universities (153

requests) and research organisations (68); fewer requests were received from the private sector (38), Small and Medium Enterprises (4) and other types of institutions (4) (figure 6).

#### *b. Users served*

227 requests for access were approved (acceptance rate: 88%) for an overall number of 306 users served in 2019. Services were provided to researchers at various career stages (figure 6), the majority of them being composed of senior researchers (113), post-docs (93) and PhD students (61). For the most part, users accessing EMBRC services used external funding (91.5%) to cover the costs of the use of the facilities, in particular through competitive funding opportunities (ASSEMBLE Plus and CORBEL); the remaining portion of users drew on their own funding to cover these expenses (figure 6).

EMBRC services were largely used through on-site access (>90%) or in combination with remote access (data not shown). Users made use of different categories of services (figure 10): the most used were experimental facilities (dry and wet lab, aquaria and mesocosms), technology platforms (molecular biology and bio-imaging), facilities for the access to marine ecosystems (research vessels, SCUBA diving facilities and sampling equipment) and provision of biological resources (culture collections, marine model organisms). Expert advice, supporting facilities and e-services were used to a lesser extent. User groups accessing EMBRC services were composed of a balanced proportion of female and male researchers (F: 45.5%, M: 54.5%).



## 5.1. USERS OF EMBRC & STATISTICS

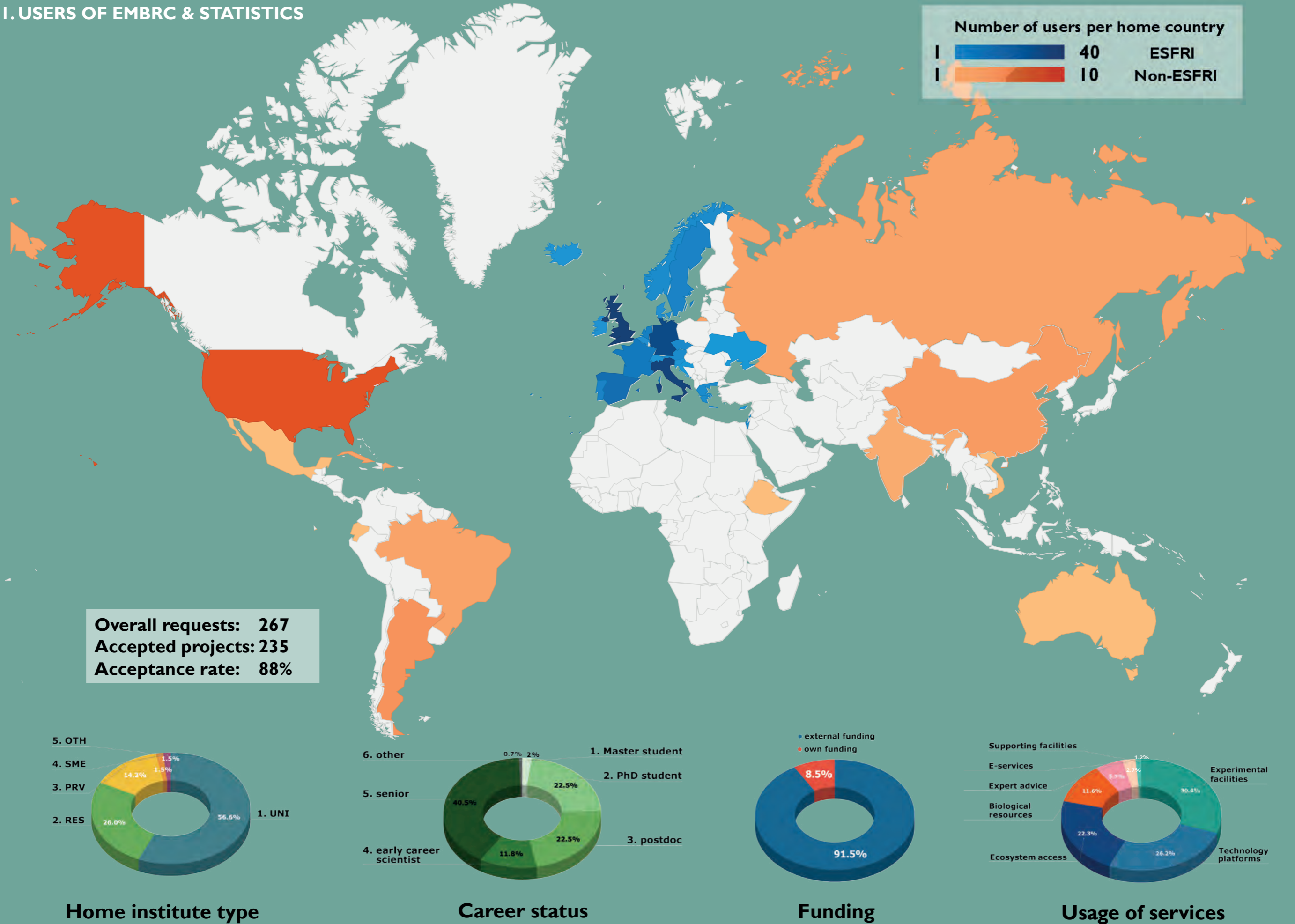


Figure 6: EMBRC users and access statistics

## 5.2. EXPERIENCES OF ACCESS

Many users have gained access to EMBRC services. Below are some of the “success stories” of projects hosted at the EMBRC sites.

### Searching for colours in the marine environment

EMBRC sites: Station Biologique de Roscoff (France)  
Marine Biological Association (UK)

EMBRC gave us access to resources that would otherwise be unavailable to us as a SME. Through our engagement with the transnational access programme of ASSEMBLE Plus, we were able to obtain and isolate structural-coloured marine bacteria. We use these brightly coloured colonies, which generate colour from nanostructures like the feathers of a peacock, for the purposes of creating colour in textiles, paints and cosmetics. The work performed within the project will contribute to a publication on the molecular genomics of structural colour (in preparation). Some of the strains were used to create works of art exhibited at Dutch Design Week, London Design Week and other international exhibitions.

Pictured: Colin Ingham, Hoekmine BV (Netherlands)



### Ichthyoplankton biodiversity on the Atlantic seamount condor using DNA metabarcoding

EMBRC site: Stazione Zoologica Anton Dohrn (Italy)

EMBRC gave me access to cutting edge HTS sequencing platforms not present in my institute but available at Stazione Zoologica Anton Dohrn of Naples (SZN) in Italy, through the funding opportunity of ASSEMBLE Plus. My project focused on the ichthyoplankton biodiversity on an Atlantic seamount using DNA metabarcoding, and the main goals were to create an inventory of the ichthyoplankton for the region using DNA metabarcoding and compare the efficiency of this genetic approach with traditional methods. The project was very successful with more than 5 million sequences generated from the ichthyoplankton samples used, and to be analysed throughout my postdoc. Publications are now being prepared in collaboration with SZN researchers. The use of the facilities together with the expertise and advice from the local team of researchers were key factors in improving the likelihood of success of this project.

Pictured: Diana Catarino, University of Azores (Portugal)



## Revealing the morphological plasticity of a cell in planktonic symbioses

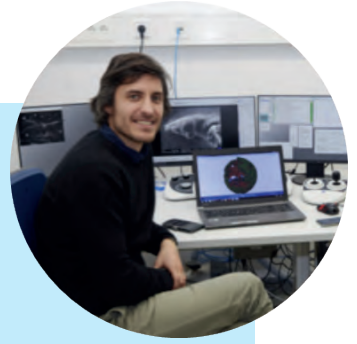
EMBRC site: Institute de la Mer de Villefranche (France)

Symbiosis with photosynthetic cells occurred several times in the evolutionary history of eukaryotes and led to the acquisition of the chloroplast, the organelle that performs photosynthesis. Living in symbiosis with microalgae is still a widespread phenomenon in today's oceanic plankton. These ecological interactions contribute significantly to oceanic primary production and the functioning of marine ecosystems. The goal of my project is to unveil the structural architecture of the symbiotic cells, in particular the chloroplasts, using cutting-edge imaging technologies.

EMBRC allowed me to have access to IMEV for collecting symbiotic plankton in near-shore waters. I have then used a 3D imaging technique to visualise subcellular modifications of the photosynthetic machinery and the microalgal cell at high imaging volume before and during symbiotic interaction.

What started as a project selected via the CORBEL Open Call developed into a long-term collaboration. The results obtained in my project will improve the knowledge of the functioning of planktonic symbioses and bring new evolutionary insights into chloroplast acquisition in eukaryotes.

Pictured: Johan Decelle, University of Grenoble Alpes (France)



## Skeletal growth mechanisms in elasmobranch fishes

EMBRC site: Observatoire Océanologique de Banyuls sur mer (France)

Our group studies how skeletons of animals develop and mineralise, with a particular focus on the bizarre cartilage of sharks and rays. This tissue has distinct features that we believe will prove useful for biomedicine. Yet, even basic knowledge of how the tissue grows is lacking. To make inroads into this problem, we gained access to EMBRC through the CORBEL transnational access programme with a project that would have been impossible at our home institute, requiring saltwater tanks for live animals and advanced microscopy.

EMBRC helped us connect these research needs, but moreover gave us access to the deep expertise of OOB, who helped us train on and troubleshoot techniques and bent over backwards to help us get the results we needed. As a result, our visits generated a large amount of novel data already heading into publications, while inspiring unexpected research directions, founding new collaborations and friendships.

Pictured: Mason Dean, Max Planck Institute of Colloids and Interfaces (Germany)



## 6. EXTERNAL FUNDING

EMBRC has in the past few years seen considerable success in Horizon 2020 framework funding, with most of its projects being accepted for funding. These projects have been important in structuring and developing EMBRC. However, there has been a lack of strong scientific projects for EMBRC to support. As an RI, scientific research should be the priority and, as a consequence, EMBRC will make it a priority to pursue more projects with a stronger scientific focus, whilst continuing to participate in strategic projects. The first research project, with four RIs including EMBRC as supporting partners, will be submitted in January 2020. However, whilst a consistent message is passed to the academic research community regarding including EMBRC in their research grants for services and support, no such projects were communicated to EMBRC in 2019.

EMBRC submitted an application for the last INFRADEV-3 call, a structuring call for established ERICs to support their continued development. The project, titled EMERGE, was unsuccessful in this highly competitive call, and was thus an incentive for the EMBRC community to rethink its strategy and future development of the RI, which has not evolved significantly in the last couple of years.

EMBRC also participated in AtlantECO, a blue growth call to structure the research community around the Atlantic Ocean and carry out a number of research activities.

The current portfolio of EMBRC projects can be found on page 30.

Bilbao meeting for European Commission grant proposal writing



## 7. EDUCATION & TRAINING

### Overview of major activities in 2019

During 2019 several new projects were launched and the training portal and its related activities were presented at different occasions. An extensive overview of all activities can be obtained on request.

**The Marine Training unit is physically hosted within the Belgian Node of EMBRC at Ghent University.** For 2019 there are however a few elements that are worthwhile commenting on in more detail:

### 3.1 ESTABLISHMENT OF CLOSER LINKS WITH IOC-UNESCO

For many years IOC-UNESCO has been operating a number of activities dealing with global capacity development in the field of Oceanographic data management, Tsunami Early Warning systems, etc. The International Oceanographic Data and Information Exchange (IODE) unit of IOC-UNESCO, which is hosted in Ostend (Belgium), leads training and education initiatives in the field of Oceanographic Data Exchange. Via the OceanTeacher Global academy, an overview of short trainings at IOC regional centres are maintained and training courses are organised on a regular basis. Collaborations between the IODE office and the IMBRSea Master's programme have been in place for a few years, via teacher exchange and hosting online courses. In 2019 the Flemish government asked both MarineTraining and the IODE to explore further close collaborations. As a result of several meetings and exchanges it was agreed to further strengthen these collaborations from mid-2019 onwards.

MarineTraining will no longer have its own online system but will instead make use of the IODE Moodle platform, while IODE will host an overview of its training opportunities on MarineTraining. Moreover, the servers of IODE will be used in the future to host the actual website and dataset of the MarineTraining portal. Exchanges also led to two successful projects that will be launched in 2020: MarineTraining will provide the data backbone for the

OceanInfoHub project for all the training related information; and MarineTraining will be of the key providers of online training content in the OceanTeacher Global Academy.

Closer collaborations with IOC-UNESCO were also validated via a service agreement in which MarineTraining will host a regional training hub for the Caribbean region through the CLME+ project in Columbia. By August 2020 a new, fully operational multilingual version of MarineTraining will be deployed ensuring a fully operational regional version of the portal. Data entered in this regional portal will also feed the global dataset of MarineTraining.

Note that this regional training hub for the Caribbean region is the first regional hub of its kind and that there is expressed interest from other regions to set up similar platforms.

Collaborations like that with IOC-UNESCO will strengthen the credibility and increase the user-base and the visibility of the platform.

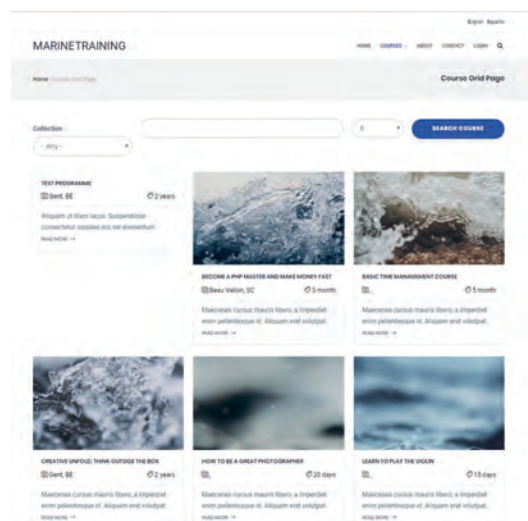
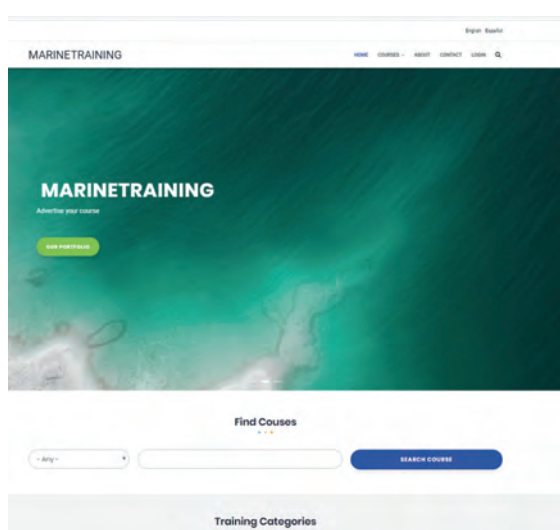


## 3.2 DEVELOPMENT OF VERSION 2.0 OF MARINETRAINING.EU

The current version of the MarineTraining portal was developed in 2013 and has since been extensively used. Despite its success there was a need to consider a new version of the portal which answers new needs and which is in line with technology updates. Mid-2019 a list of required functionalities for the new portal was designed and from August 2019 the software development was started. Some of the new features of MarineTraining 2.0 are:

- The interface of the portal will be fully multilingual (focus languages will be English, Spanish and French in phase I).
- The portal will have thematic and regional subportals which allow for a controlled distributed data-entry and maintenance.
- Besides training programme data, the new portal will also include libraries for training resources.
- Marine Training 2.0 will have a fully responsive interface.

By January 2020 a prototype of the new version will be launched and already be used for new data input. See below for screen captures of the new design:



### Website and entry points

Marine Training general website: [www.marinetraining.eu](http://www.marinetraining.eu) and [www.marinetraining.org](http://www.marinetraining.org)

Marine Training Youtube channel: [www.youtube.com/channel/U-CajzbV3s\\_XbZXr2gssgYL\\_w](https://www.youtube.com/channel/U-CajzbV3s_XbZXr2gssgYL_w)

IMBRSea Master programme website: [www.imbrsea.eu](http://www.imbrsea.eu)

IMBRSea Youtube channel: [www.youtube.com/imbrsea](https://www.youtube.com/imbrsea)

IMBRSea Facebook: [www.facebook.com/IMBRSea](https://www.facebook.com/IMBRSea)

IMBRSea Instagram: [www.instagram.com/IMBRSeaofficial](https://www.instagram.com/IMBRSeaofficial)



IMBRSea Graduates 2017-2019

### 3.3 DESIGN OF IMBRSEA 2.0

The International Master in Marine Biological Resources, IMBRSea, was launched with Erasmus Mundus funding in September 2017. IMBRSea is a joint Master's programme organised by ten European universities in the field of marine sciences. The programme takes the strengths from the previous International Master of Science in Marine Biodiversity and Conservation (EMBC+) and prepares students for the rapidly evolving demands of the blue bio-economy and research on the sustainable use of marine biological resources.

Many EMBRC operators are involved in the organisation of the Master's programme. A few examples with teaching roles include: Ghent University, Sorbonne University, University of the Basque Country, Bergen University and the University of the Algarve. Many more EMBRC operators play a role as thesis or internship providers. Currently IMBRSea can be considered globally as the largest programme of its kind. The total student population in 2019 was 190 students from 50 nations.

In 2019 the following key events were organised within the framework of the programme: two summer schools were organised in the Tjärnö marine station; a symposium, 'Diving into marine minds', took place in Brest during the last week of June; (in total over 260 people participated in this 5-day event); a unique online preparatory course, IMBRSea Compass, was designed and several teacher and student exchanges took place.

The final cohort of the Erasmus Mundus funding scheme began in 2019 and a new version of IMBRSea will be launched in 2020. This new version has novel specialisation modules, more study places and incorporates Gothenburg University as a new partner. In early 2020 a new proposal for funding from Erasmus Mundus will be submitted.

A new website for IMBRSea was launched in November 2019 (see [www.imbrsea.eu](http://www.imbrsea.eu)). Applications for the 2020 intake opened in November 2019. The first round of applications will close on 1 February 2020.

#### Current staff at the Marine Training unit are:

**Tim Deprez** — overall coordination of MarineTraining.eu

**Tim tkint** — IT Manager

**Luiza Campos** — IMBRSea Coordination & Marine Training project follow-up (since Sept' 2019)

**Micheline Demey** — IMBRSea Coordination project manager (since Sept' 2019)

**Marleen Roelofs** — Marine Training project manager

**Evelyn Paredes Coaral** — Marine Training project manager

**Rodrigo Verschraegen** — Marine Training administrative support (since Oct' 2019)



## 8. SECRETARIAT & MANAGEMENT

### Summary

Administrative activities at EMBRC gained considerable ground in 2019, adapting to the separation from Sorbonne University towards a fully independent organisation, finalised by the closure of the university budget line in the final quarter of the year. This required the development of new procedures as well as fresh collaborations with external accounting and legal services with the intention to improve budgetary reporting and monitoring. One of the focus areas for 2019 was to ensure a fully staffed secretariat and a number of key appointments were made over the course of the year, bringing new ideas and skills. Looking forward, further work towards efficient data protection, staff on-boarding and streamlining archival procedures will be key targets for 2020.

### Human Resources

Dr Nicolas Pade formally began as Executive Director of EMBRC in January 2019, following on from Dr Ilaria Nardello whose successful tenure ended in March this year after a transition period. The EMBRC team was boosted by the arrival of several new employees in 2019 and interview panels for these appointments were composed of experts drawn from EMBRC Nodes and a representative of the EMBRC General Assembly. New members to the team include Scientific Officer & Project

Manager (Sidonie Gras); Access Officer (Davide Di Cioccio); and Financial & Administrative Officer (Alexandra Vasic). Interviews were also held for the role of Communication Officer and a key priority for 2020 is to fill this role and hit the ground running with the EMBRC communication strategy. See the next page to meet the 2019 EMBRC team.

A key event at the EMBRC HQ in 2019 was the refurbishment of our offices to create an open space. The aim of this was both to create more room for our growing team and better involve the team in the development of EMBRC, improving communication and teamwork. By the same token, weekly team meetings were instated as a means for all HQ staff to share their weekly activities and tasks and a platform for reporting back on training and travel.

The range of courses undertaken by EMBRC colleagues over the past year aimed to bridge both administrative and scientific aspects of the Research Infrastructure. These included intensive courses in H2020 financial administration and FAIR data, as well as shorter workshops focussing on specific topics, including In-Kind Contributions and monitoring Research Infrastructures through methodology and Key Performance Indicators.

EMBRC HQ Offices after renovation



## 8.1.



**Clockwise, from top right:**

Alexandra Vasic, Financial & Administrative Officer  
Lucie Salvaudon, Secretary to the General Assembly  
Sidonie Gras, Scientific Officer & Project Manager  
Nicolas Pade, Executive Director  
Davide Di Cioccio, Access Officer  
Katharine Worley, Administrative Assistant

Over the course of 2019 EMBRC streamlined working contracts for the whole team and ensured equal benefits for all by implementing a company agreement. Benefits include a bonus, holiday and remote working agreements, as well as the optional introduction of lunch vouchers. Independent professional health insurance for both executive and non-executive staff was set up, as well as an independent assessment of the suitability of the workplace.

## SECRETARIAT & MANAGEMENT

### Administration of EMBRC-ERIC

There were a number of major administrative and financial changes at HQ-level in 2019. This included a total reconfiguration of internal financial procedures in anticipation of independence from Sorbonne University. EMBRC began working in close collaboration with a private accounting cabinet (Expertens), as well as with a private legal firm (Victoire Avocats). With the aim of selecting an independent Accounts Auditor, EMBRC interviewed potential collaborators and was pleased to make an appointment. With financial independence came a new accounting software, iBiza, and new ways of recording expenditure.

EMBRC HQ undertook a project to improve data security and storage by transitioning to Dropbox Business midway through 2019. This introduced better encryption and sought to streamline working practices by minimising duplication. Each team member now has a secure personal storage space and this will be key to further work on GDPR strategies in 2020. This new method creates a platform for the collaborative preparation and circulation of documentation for governance meetings, which was demonstrated through its successful use as part of EMBRC GA 5.

Extensive work went in to preparing the new budget, budget tables and reporting and this was presented to the General Assembly. On a broader scale, significant consideration was given to the yearly calendar of reporting, which was established and agreed by the General Assembly: this includes deadlines for the Work Programme, Annual Report and Budget. Further initiatives to streamline operations and reporting included the implementation of a Travel and Outcomes table. The HQ Update was made public via the EMBRC website with the aim to keep stakeholders informed of EMBRC operations.

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## 9. COMMITTEE OF NODES

### Report on activities in 2019

In 2019, the Committee of the Nodes (CoN) met three times for physical meetings in Paris (3-4 May), Naples (4-5 June) and Gournes, Heraklion (24-25 September). In order to reduce the carbon footprint of this series of meetings, future CoN meetings were organised using teleconferencing technology (13 November, 13 December) with only two face-to-face meetings per year. At all CoN meetings participants received an update on headquarters (HQ) activities, to guarantee the continuous information flow from HQ to the nodes.

At the first meeting, a Vice Chair of the CoN was elected to support the Executive Director in his role as Chair and to ensure the perspectives of the nodes are always taken into consideration. Jan Vanaverbeke (EMBRC-BE) was elected as CoN Vice Chair, and now cooperates in preparing agendas for the CoN and represents the CoN at the EMBRC General Assembly (GA). The presence of the CoN Vice Chair in the GA has been an important step in the transparency of the EMBRC governance, improving the flow of information and building trust between the executive and authoritative arms of the EMBRC governance.

A firm CoN ambition for 2019 was to improve the structure of the nodes. Nodes are at various stages of maturity and complexity, depending on their life span and political, governmental and funding context in their countries. CoN meetings had a fixed and semi-structured topic 'Update from the nodes', where contributions focused on node governance, relations with funders and stakeholders (science and industry), organisation of public events, national website developments and recording of user statistics. This has been both useful as an exchange of best practices, where the more advanced nodes have been able to support those that are less mature, and instrumental in cementing the nodes.

Recurrent items on the agenda of the CoN included opportunities for project proposal submissions, discussions on dealing with the lack of a Communication Officer and improving the central access point for EMBRC services. In addition, progress on important documents such as the Rules of Operations and the Service Level Agreements was discussed. While the final decision on such documents sits with the GA, the CoN has demonstrated its use in bringing the node perspective at an early stage and avoiding lengthy debates in the GA.

The CoN discussed and prepared several documents in preparation of the EMBRC-ERIC General Assembly meetings. These included a proposal for the composition of the Science and Innovation Board, the EMBRC-ERIC Scientific Strategy, as well as contributing to the Work Programme 2020. The Scientific Strategy was based on a horizon scanning during the CoN meeting of April 2019, input from national strategic priorities, followed by an interactive writing process during the meetings of June and September. As such, the Scientific Strategy is at the cutting edge while fully supported by the EMBRC nodes. The Work Programme 2020 incorporated many of the work packages that made up the non-funded H2020-INFRADEV 3 EMERGE proposal. This project focused on the structuring and solidifying of the EMBRC structure into all nodes and operators while improving its positioning with respect to the regions in Europe. Urgent actions were distilled from the EMERGE proposal and incorporated into the EMBRC Work Programme 2020.

© David Luquet (EMBRC-FR)

## 10. EMBRC-ERIC GENERAL ASSEMBLY

The EMBRC-ERIC General Assembly is the governing body of EMBRC-ERIC and responsible for the overall supervision of EMBRC-ERIC strategy, governance and scientific development. It was constituted on 2 May 2018 following the creation of the ERIC, and has convened five times since its constitution under the chairmanship of Prof. David M. Paterson. During the year 2019, the EMBRC-GA held two meetings, in St Andrews, Scotland and in Eilat, Israel. With the beginning of the operational phase of EMBRC-ERIC, the General Assembly's main activities have been linked to the setting up of executive and governance assets. It has conducted the selection

and recruitment of the Executive Director, approved the budget, workplan, and science strategy of the ERIC, and supervised the constitution of EMBRC-ERIC essential elements such as the Rules of Operations, Service Level Agreements, and the Science & Innovation Board.

As per accordance with the statutes, each of the nine EMBRC-ERIC founding members is represented at the GA by one scientific and one administrative delegate nominated by the Members countries' ministries. The current delegates are:

Country	Administrative Representative	Scientific Representative
Belgium	Koen Lefever Didier Flagothier (alternate)	Gert Verreet Ann Vanreusel (alternate)
France	Eric Guittet (GA Vice-Chair)	Bertrand Meyer
Greece	Stylios Kastrinakis Maria Gkizeli (aternate)	Antonis Magoulas Georgios Kotoulas (alternate)
Italy	Grazia Pavoncello	Roberto Danovaro Marco Borra (alternate)
Israel	Moshe Ben Sassoon Ilana Lowi (alternate)	Simon Berkowicz
Norway	Christine Daae Olseng	Amund Maage
Portugal	Marta Abrantes Cristiana Leandro (alternate)	Adelino Canario (GA Vice-Chair)
Spain	Inmaculada Figueroa Rojas	José Manuel García Estevez Belén Martín Míguez (alternate)
UK	Ian Davies	David Paterson (GA Chair)

Members of the EMBRC General Assembly at GA IV, St Andrews, Scotland



## 11. PROJECTS

The 2019 EMBRC Project Portfolio included the following projects:

### EMBRIC

Partners in the project: EMBRC-ERIC (SU); EMBRC-FR: SU; EMBRC-UK: NERC-BAS, SAMS, MSS, MBA, USTAN; EMBRC-PT: CCMAR; EMBRC-IT: SZN, CNR; EMBRC-BE: UGent; EMBRC-GR: HCMR



The European Marine Biological Research Infrastructure Cluster (EMBRIC) was a cluster project designed to accelerate the pace of scientific discovery and innovation from marine Bio-Resources. The project brought together the RIs EMBRC, ELIXIR, EU-Openscreen, MIRRI, and the projects AQUAEXCEL and RISIS, to develop new applications deriving from marine organisms, promote the use of marine biological resources, create new service pipelines, and develop industry standards.

The project worked on its main goal of accelerating the pace of scientific discovery and innovation by developing best practices and integrated training programmes. It further aimed to facilitate technology transfer, knowledge transfer and transnational access by connecting six existing European RIs and partners from Academia, Research institutes, not-for-profit organisations and industry.

The project helped to develop EMBRC through the creation of joint academia-industry activities, allowing industry to directly integrate results and protocols in commercial processes. EMBRC finished its 4th and final year in June, 2019. It succeeded in connecting RIs and establishing a virtual screening platform. A data management service – the EMBRIC Configurator – was effectively set up to help with the management, analysis and interpretation of marine data. Three discovery pipelines for marine secondary metabolites, marine proteins and marine carbohydrates as well as two company fora on aquaculture and microalgae were additionally implemented. EMBRC was involved in the project through the establishment of multidisciplinary technological workflows (WPs 2-4), joint development activities (WPs 6-8), training and knowledge transfer (WP9) and pilot access to the cluster facilities and services (WP10).

### ENVRIplus

EMBRIC partners: EMBRC-ERIC (SU); EMBRC-UK: MBA, USTAN

ENVRIplus was the cluster project of the Environmental and Earth System Research Infrastructures (RIs) bringing together RIs, projects, and networks with technical specialist partners to create a more coherent, interdisciplinary and interoperable cluster of Environmental RIs across Europe. This project also finished in 2019, and succeeded in developing a wide variety of technical, e-science and other tools to be used throughout the environmental RI cluster, compared to individual developments by each Research Infrastructure.

ENVRIplus was a key project for EMBRC, despite the small involvement of the RI, as it ensured a link with the Environmental RIs. Particularly the participation in the Board of European Environ-

mental Research Infrastructures (BEERi), the environmental equivalent to the Life Sciences RI (LS-RI) group (formerly BMS group), ensured that EMBRC has been able to maintain an involvement in this other important landscape over the past 4 years. BEERi will continue as a forum for the environmental RIs to coordinate amongst each other, and EMBRC will remain a member for the foreseeable future. With new cluster projects launching around EOSC, EMBRC will perform an essential role in bringing information on the LS-RI project, EOSC-Life, to the BEERi, and transmitting the relevant messages back on ENVRI-FAIR to the LS-RI.

## CORBEL

Partners in the project: EMBRC-ERIC (SU); EMBRC-FR: CNRS; EMBRC-IT: SZN; EMBRC-UK: USTAN

The project on COordinated Research Infrastructures Building Enduring Life-science Services was established as a collaborative framework of shared services between the ESFRI Biological and Medical Research Infrastructures that transform the European research community from the discovery of basic biological mechanisms to applied medical translation – through the provision of a unified interface, aligned services and coordinated user access to a range of advanced technology platforms. CORBEL is a key consortium for the RIs as it encourages the increase of cooperation among them for the harmonisation of researchers' access to cutting-edge technologies and services. This has been done through the establishment of a sustainable platform of aligned services that will enable faster admission to a wider portfolio of technologies and services to boost research projects.

EMBRC participated in the coordination of an access track in collaboration with ELIXIR and Euro-BioImaging research infrastructures. As part of this activity, the Marine Invertebrate Models Database (<http://marimba.obs-vlfr.fr/home>) was successfully set up as a public portal in 2018 and was progressively updated throughout 2019. At the end of the year, EMBRC, among other CORBEL partners, was included in a brochure detailing its services and how to access them. The brochure was printed and will be distributed at future events. A financial report of CORBEL, for which EMBRC provided information, was submitted.

## EOSC-Life

Partners in the project: EMBRC-ERIC; EMBRC-ES: ESIMAT-UVIGO, PiE-UPV/EHU; EMBRC-FR: SU; EMBRC-PT: CCMAR; EMBRC-BE: UGent, VLIZ

EOSC-Life brings together the 13 Biological and Medical ESFRI research infrastructures (BMS RIs) to create an open collaborative space for digital biology. The project works to transform European life-science by providing a continent-scale, collaborative and interdisciplinary environment for data science with a goal of enabling life-scientists to find, access and integrate life-science data for analysis and reuse in academic and industrial research. By publishing data and tools in a Europe-wide cloud EOSC-Life aims to bring the capabilities of big science projects to the wider research community. Through EOSC, scientists are able to gain direct access to FAIR

data and tools in a cloud environment available throughout the European Research Area and make BMS RIs' data resources FAIR. Scientists can further publish their data in the EOSC following guidelines and standards (e.g.EDMI), which aims to help increase the availability and use of data generated by the RIs.

The Life Sciences' project for the European Open Science Cloud had its Kick Off meeting in March 2019. The project gives way for EMBRC to have an important involvement in this highly strategic data initiative. The RI took part in a number of tasks and activities over the past year to advance its development. Monthly calls for each WVP were initiated to ensure project evolution. Nearing the end of the year, the project organised a retreat to gather the RIs involved in the project to discuss uncertainties in the projects and objectives. The idea for the creation of translators, individuals who have a thorough understanding of the project and can communicate it in a jargon-less way, was noted and will be implemented in 2020. The EMBRC Project Manager and the EMBRC-ES National Scientific Representative will be part of the translator group.

EMBRC and its nodes were involved in the following activities in EOSC-Life in 2019:

- WP3: Demonstrators and Open Calls for User Projects
  - CCMAR began working on a demonstrator project and developing a workflow for genome annotation.
  - An open call for industry began to be constructed for 2020. It was decided that the call is flexible in terms of what can be offered and what is accepted as a user project.
  - EMBRC was put in charge of co-leading the 3rd open call of the project which is set to be launched in spring of 2020. EMBRC worked with WVP leaders to realise a cohesive and captivating call.
- WP4: Policies, specifications and tools for the management of data for biological and medical data
  - The organisation of thematic workshops began in 2019 and EMBRC is leading the development of one such workshop on Intellectual Property and the Nagoya protocol which will be held in 2020.
- WP6: FAIRification and provenance services
  - Task 6.4, to create a document on FAIR Data Management, was completed.

Plentzia Marine Station (PiE-UPV/EHU), EMBRC-ES





## ERIC Forum

Partners in the project: EMBRC-ERIC; EMBRC-ES: ESIMAT-UVIGO, PiE-UPV/EHU; EMBRC-FR: SU

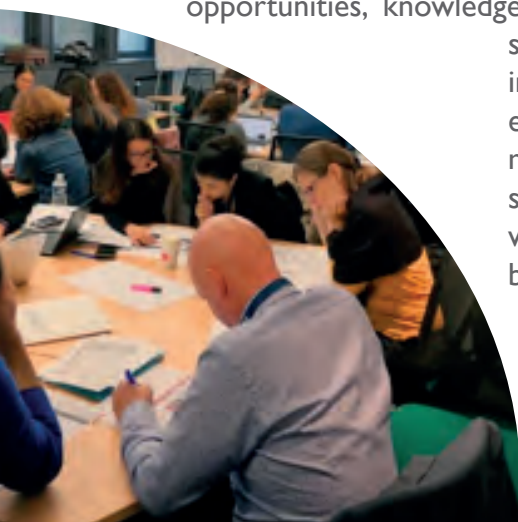
The project was accepted with the goal of forming a consortium among Research Infrastructures with ERIC status and others in order to share, network and coordinate. The project works towards reinforcing the informal ERIC network or its successor framework. It supports the organisation of specific meetings, targeted thematic workshops focusing on shared challenges such as the development of internal procurement rules, harmonised reporting, VAT exemption practices, insurance and pensions policies and training of governance bodies representatives. The project supports common communication and outreach activities. It further supports the strengthening of external representation of ERICs as stakeholders in consultations and other policy actions that could affect them. The activities in the ERIC Forum benefit EMBRC as the Research Infrastructure is a relatively newly operational ERIC while information on the topic was previously decentralised and difficult to find. The project creates a link to other ERIC for access to resources, collaborations and feedback on all aspects of the defining characteristics of the ERIC status. In order to assist and advance ERICs, the project has been targeting key sticking points often experienced by ERICs and provide its community with assistance or solutions on such issues. The Forum is now also evolving towards becoming a strategic representative of the ERICs in direct discussions with the European Commission, taking on the task of highlighting and informing the Commission of their value and their contribution to the strategic landscape.

In 2019 the ERIC Forum had its Kick Off Meeting on 31 January. EMBRC was involved in the organisation of a restitution workshop aimed at educating on business modelling and related survey tools as part of the WP for an ERIC Sustainability Plan. EMBRC took part in multiple exercises including a survey (under WP3) to better understand the ERICs' best practices and remaining challenges in the fields of HR, administration, operations and finance to develop reports on the subjects further along the project. Another was focused on the EMBRC audience and stakeholders in order to strengthen the identity of the ERIC community among its stakeholders. The first draft of a Policy Brief on funding models was written as part of WP6. EMBRC contributed to this activity by leading the section on regional funding and contributed to the drafting on ERC.

## RI-VIS

Partners in the project: EMBRC-ERIC; EMBRC-PT: CCMAR

The Consortium was established to increase the visibility of European RIs to broader scientific communities, industry and strategic partners in third countries. RI-VIS targets communities and stakeholders with current and precise information and matches them with RIs to facilitate the development of new collaborations, user accessibility, collaborative and innovative actions, funding opportunities, knowledge transfer and training. Activities of the project include mapping RI services to target new communities and identify routes to maximise information exchange and building new partnerships, that EMBRC is expected to strongly benefit from. In 2019, the project held its Kick Off meeting on 25-26 February. EMBRC is leading WP5 for the long-term sustainability of RIs. As part of this WP, EMBRC held two communication workshops, one in June and the other in October, which were attended by both RI-VIS and ERIC Forum partners. The workshops gathered com-



munication officers from over 20 RIs to develop a Communication Toolkit for RIs, aiming to improve the way in which we communicate and promote RIs. The Communication toolkit was led by EMBRC-PT (CCMAR) and has been a huge success in mounting a communicators community amongst RIs and EMBRC will continue to encourage activities and group meetings. This deliverable will be finalised in 2020 and a third workshop will take place.

EMBRC participated in WP3 by providing information and feedback in the organisation of the first of three outreach and brokerage events for RIs to meet with their counterparts to establish new collaborations or strengthen existing ones. The event locations were decided upon and will be in Brazil, South Africa and Australia. Lastly, EMBRC is contributing to the RI communication strategy of WP4 and will create links between it and the Communication Toolkit.

## ASSEMBLE Plus

Partners in the project: EMBRC-ERIC; EMBRC-FR: UPMC (SU); EMBRC-ES: UPV/EHU; EMBRC-GR: HCMR; EMBRC-IL: HUJI; EMBRC-IT: SZN; EMBRC-PT: CCMAR; EMBRC-BE: VLIZ; EMBRC-UK: SAMS, MBA, USTAN, NERC-BAS, MSS.

ASSEMBLE Plus comprises 32 marine stations and institutes from 14 European and associated countries under the leadership of EMBRC. The project provides scientists from academia, industry and policy with a quality-assured programme of Transnational Access (TA) and Virtual Access (VA) to marine biological stations. The partners offer a wide variety of marine ecosystems, unique marine biological resources, state-of-the-art experimental and analytical facilities with integrated workflows, historical observation data, and advanced training opportunities. This project is an opportunity to increase the visibility of EMBRC as well as community engagement with the RI.

In 2019, ASSEMBLE Plus, composed of five Joint Research Activities aimed at creating new tools and methodologies for EMBRC users, saw progress in the following areas:

- **Genomics Observatories:** EMBRC was involved in the production of a roadmap of long-term marine genomic observatories through the practice and optimisation of coordinated genomics observations in planktonic and benthic communities. Ocean Sampling Day (OSD), a one-day water sampling event for mega sequencing, took place: during the summer solstice, science teams from across the world take samples from the ocean to identify the microbial content of the seawater in their area. This year, 65 marine stations delivered high quality genomic DNA to HCMR, the coordinating institute.
- **Cryobanking:** In the context of biobanking, project partners worked on designing cryopreservation protocols of various marine organisms (e.g. marine invertebrates and algae). This year, the research team at the Universidade de Vigo succeeded in creating cryopreserved mussel larvae (*Mytilus galloprovincialis*) for the first time. These were grown to juvenile stage and put to ropes in the marine environment to reach maturation, a proof of concept that cryopreservation of mussel larvae can be used to improve market seasonality. CCMAR worked on the cryopreservation of the Portuguese oyster (*Crassostrea angulata*) and for species of biomedical interest, such as zebrafish. SAMS developed a method for cryopreserving gametophytes of the brown seaweed, (*Saccharina latissima*). With the combined effort of several institutions towards standardising and training, ASSEMBLE Plus has so far developed cryopreservation approaches for over 200 algal species (micro and macroalgae).



ASSEMBLE Plus team at the General Assembly, Naples

- **Functional Genomics:** Protocols were fully established for two species of sea urchin (both *Paracentrotus lividus* and *Strongylocentrotus purpuratus*) and three other marine metazoans (the cnidarian *Clytia hemisphaerica* and the ascidians (*Ciona intestinalis*, *Phallusia mammillata*)). Insertional transgenesis have now been shown to work in all the four animal models, sea urchins, ascidians, *Clytia* and amphioxus. Work will now commence on the brown algae *Ectocarpus*. The first gene knockout strains have been identified in the diatom *Phaeodactylum tricorutum*.
- **Developing instrumentation:** Station Biologique de Roscoff (France) and the Universidade de Vigo (Spain) collaborated over the development of a tidal simulator. Together, they developed three prototypes and have been upscaled to 500 litres, including sensors for ultrasound levels, regulating pH, and experimental replication with a multiple tank system. Meanwhile the Hebrew University of Jerusalem (Israel) improved pH regulation and the implementation of in-situ PAM (pulse amplitude modulated fluorometer) analysis in their Red Sea simulator. The Observatoire Oceanologique of Banyuls-sur-Mer (France) adjusted their microplate experimental system to be easier to implement and get a better fit to natural spectra. Flanders Marine Institute (Belgium) developed larger tanks and smaller mesocosms for their ocean acidification experimental facilities and sediment micro-profiling system. CCMAR developed an ocean acidification facility. The Marine Biological Association (UK) have improved their mesocosm facility and Stazione Zoologica Anton Dohrn (Italy) updated their seagrass culture (light, pH).
- **Scientific Diving:** The Scientific Diving research team focused on developing their capabilities in stereophotogrammetry, which generates 3D point clouds and stitches the images together to build a 3D image. Researchers worked in multiple teams operating from the Arctic to the Mediterranean, to interrogate the results that their respective models generate to further use for developing a standard methodology to be applied by different teams to produce the same results, and translatable between different projects.

Over the past year, the project further organised 3 calls for transnational access in which it received over 200 applications. Of the proposals, 177 were approved to visit partner institutes. ASSEMBLE Plus also held events as part of the JRAs, such as workshops on FAIR data management for long-term biological and omics data, Cryopreservation of Marine Genetic Resources and Access provisions. Lastly, an amendment was drafted to finally include EMBRC-ERIC as full partner of the project.

# UPDATES from our NODES



## 12.1. EMBRC-BE (BELGIUM)

### Service offer

EMBRC-Belgium supports fundamental and applied research and educational activities in the sustainable use of marine living resources, blue biotechnology, ecosystem health and marine ecosystem management. Belgium takes part in EMBRC via five operators, each contributing with several fundamental, expert-based and state of the art services, including: provision of marine biological resources via access to culture collections at UGent and UHasselt; sample collection facilities at VLIZ and RBINS; access to North Sea marine ecosystems, experimental facilities at RBINS, UGent and VLIZ; and omics and imaging technology platforms in KU Leuven and UGent. UGent coordinates the ERIC-wide activities for training and education via the Marine Training platform ([marinetraining.org](http://marinetraining.org)) and the coordination of an international master's programme ([imbr-sea.eu](http://imbr-sea.eu)). Through EMBRC-Belgium operators provide expertise along three main themes: I. Ecological and evolutionary responses to ocean warming, pollution and acidification; II. Efficient and sustainable food production, and new technological applications; III. New applications to measure ecosystem health.

### National infrastructure

A Memorandum of Understanding was signed by the legal heads of each operator and was implemented in the summer of 2019.

### National website and entry point

The national website <http://www.embrc.be> is up and running on WordPress and is being fully updated in the coming weeks as the liaison officer is visiting all the labs to make sure the services are correct and accurate and the right team members are listed on the site.

Social pages will be Twitter and LinkedIn. A biannual newsletter will be sent out to all EMBRC-Belgium stakeholders.

### Tracking of user statistics

All users (in-house and external) of the EMBRC services are tracked manually by each research group and collected at the node office. We are implementing a tracking system through registration via the website as a catalogue so all users should 'book' their services through the website to be able to track automatically, as opposed to manually, especially external users. A move to integrate the ARIA platform for applying for access to the RI when operational is envisaged.

### National support of RIs

The Flemish operators receive financial support from the Flemish Science foundation programme for large infrastructure for 2019 and 2020. A new proposal is being prepared (call closes 15 April 2020) for the next 4 years. RBINS participates based on its own budget. The membership fees are paid by the Belgian Science Policy Office (Belspo).

#### EMBRC Contact Points:

Node Coordinator: Ann Vanreusel  
National Liaison Officer: Shanna Vanblaere

#### Local contact persons in each operator/ research unit:

UGent-Marbiol : Shanna Vanblaere  
UGent-PAE : Wim Vyverman  
UGent-Phycology : Olivier Declercq  
UGent-GhenToxLab : Jana Asselman  
UGent -LM : Anne Willems  
UGent-ARC : Gilbert Van Stappen  
UGent-VetPath : Koen Chiers  
RBINS : Jan Vanaverbeke  
KU Leuven : Filip Volckaert  
UHasselt : Karen Smeets  
VLIZ : Dre Catrijsse



## 12.2. EMBRC-ES (SPAIN)

### National infrastructure

Spanish operators signed an agreement of collaboration towards implementing EMBRC-ERIC during the preparatory phase, publicly signed by the rectors of both Universities on 10 June 2016 ([www.ehu.eus/es/-/e\\_20160610\\_convenio-vigo](http://www.ehu.eus/es/-/e_20160610_convenio-vigo)). The collaboration agreement ensures EMBRC-Spain participation in the H2020 project ASSEMBLE plus with PiE-UPV/EHU as partner and UVigo as linked third party (arrangements the other way round are possible).

In order to move towards the incorporation of Spain as a founding country in EMBRC-ERIC an agreement was signed between the Universities of Vigo and the Basque Country and the Ministry of Economy and Competitiveness in 2017 (ratified by Spanish Council of Ministers on 15 December 2017), constituting EMBRC-ERIC as a non-legal entity.

### Service offer

Services are offered as they are presented in the ASSEMBLE Plus TNA. PiE-UPV/EHU offers access to ecosystems, access to biobank and research platforms. Specialities lie with biobanking, marine bioresources and environmental health assessment/(eco)toxicology. Ecimat-UVigo provides access to ecosystems and research platforms and aquaculture, marine bioresources and animal welfare are among their specialities.

### National website and entry point

Institutional web pages are maintained by each operator but there is no all-encompassing EMBRC-Spain web page. A total of 6000€ has been allocated for the EMBRC-Spain webpage in the project EMBRedES but the initial idea of mirroring the EMBRC-PT website has been put on hold until EMBRC-ERIC has hired a Communication Officer and made corporate decisions regarding the main website. Each institution has its own social media pages but these are not grouped under EMBRC-ES.

### Tracking of user statistics

All users (in-house and external) who make specific use of the services are tracked manually.

ECIMAT in UVigo was established as a service-providing institution from the outset and there is a service provision portal for internal and external users.

External accesses provided by PiE-UPV/EHU in 2019 includes:

- 3 ASSEMBLE Plus projects (2nd and 3rd call) and 4 more approved (4th and 5th call will begin in January 2020).
- 2 researchers have access services in collaboration with PiE-UPV/EHU research groups.
- Regional access scheme has been approved with the Basque Country with an open budget to cover necessities of the companies in marine biotechnology and aquaculture. 2 projects with companies and expert advice have been sought by an offshore aquaculture company and a local entrepreneur for a start-up in crustacean aquaculture.

External accesses provided by ECIMAT-UVigo in 2019 include:

- 8 ASSEMBLE Plus projects (2nd and 3rd call) and 7 more approved (4th and 5th call, beginning in January 2020);
- 10 R&D projects with companies/associations (non-academic);

In addition, users can request individual services (comprising access to the facilities, laboratories, equipment, data analysis, marine organisms supply, etc.). There were approximately 1000 services provided in 2019, 90% of which were internal users (UVigo), the rest were external users from industry and other research institutions, TNAs included).

ECIMAT-UVigo has a system that enables the extraction of simple statistics according to the type of user (external/internal).

### National support of RIs

National support comes in the form of competitive calls for equipment (linked to FEMP program) and networking activities (with emphasis on ESFRI research infrastructures), as well as strong involvement from Inmaculada Figueroa, Deputy Vice Director General for Internationalisation of Science & Innovation in the Spanish Ministry of Science, Innovation & Universities.

Also pertinent is the project EMBRedES for structuring and improving governance of EMBRC Spain and exploring incorporation of other operators (the Spanish Biobank of Algae in the Canary Islands), 40,000 €.

UVigo is constructing a mesocosms service with the equipment grant obtained in 2017. A new equipment provision grant was obtained in 2019 (systems to control temperature and environmental variables, feeding regime, circadian rhythms in water tanks: 231,110 €). An application by PiE-UPV/EHU failed because the money allocated in the FEMP programme to the autonomous region was exceeded.

### Regional support

Participation in EMBRC-Spain of Spanish operators is possible thanks to the involvement of

regional governments:

- ECIMAT-UVigo: GAIN, the Galician Agency for Innovation of the Galician Regional Government, covers 50% of the Spanish annual financial contribution to EMBRC.

- PiE-UPV/EHU: HAZI Fundazioa, the Basque Government office for rural and coastal primary production and development, covers 50% of the Spanish annual financial contribution to EMBRC.

- A small regional access scheme is signed annually to contribute to the research and development of regional companies associated with Hazi-Fundazioa. The latter has initiated a fellowship to annually incorporate an EMBRC technician within PiE-UPV/EHU to run aquaria facilities and for the culture and maintenance of marine biological resources.

### Other important news

In July and November 2019 two meetings took place (in Las Palmas and Bilbao) with members of the “Spanish Bank of Algae” University of La Laguna (Canary islands) to explore possibilities of incorporation into EMBRC-Spain.

The RRI Unit was consolidated and current work is focussing on updating the Biosecurity



ECIMAT, © EMBRC-ES



Plentzia Marine Station (PiE-UPV/EHU) at dusk, © EMBRC-ES

plan and obtaining the ISO 9001: 2015 Quality Certification (ECIMAT-UVigo).

Sequenced DNA of the *Cyprinodon variegatus*, model species, teleost fish, was made available in open access databases, currently used for ecotoxicology, and is easy to work with in the lab (ECIMAT-UVigo).

There was development of a methodology to differentiate Sea Urchins by sex which saw a 35% reduction in the number of urchins needed per trial. This meant there was less space required and more control over the design of the experiment (ECIMAT-UVigo).

A flow cytometry service and a high resolution histological slide scanning service were incorporated at PiE-UPV/EHU.

On 28 June, the Commission of Education for the Basque Government visited PiE-UPV/EHU. Further to this, a public address was held in front of the Commission of Education of the Basque Government at the Basque Parliament to present projects in which PiE-UPV/EHU and EMBRC are involved.

The central offices hosted a presentation of the 3 Basque Country technological parks to present PiE-UPV/EHU and EMBRC services. A promotional video of PiE-UPV/EHU and EMBRC services has also been prepared for the BioSciences companies in the Basque technological centres.

On 1 August representatives of the Galician Innovation Agency (GAIN) visited and were shown the facilities and informed about EMBRC activities.

Five lectures provided by TNA visitors were broadcasted by the UVigo TV channel and made available online. Likewise, a promotional video was recorded after one of the TNA visits (Sean R. Stankowski, Sheffield University).

Presentations of EMBRC-ERIC and ASSEMBLE Plus TA took place at: the Symposium on Pollution responses in Marine Ecosystems, Charleston, USA; the Environmental Specimen Banks ES meeting, Stockholm, Sweden; the Congress of the Iberian Association of Comparative Endocrinology, Faro, Portugal; the International Symposium of Marine Biology, Braga, Portugal; and the “Café con Sal” Conferences Cycle, Vigo, Spain.

As part of the Blue Bioeconomy Forum Final Stakeholder event, organised by DG MARE and EASME, 25 June 2019, EMBRC-ES gave a presentation on “The Basque Bio-Region: regional innovation ecosystems in marine bioeconomy and EMBRC”,.

Finally, a special episode was recorded for the Basque National television programme “Teknopolis” on the ARMS activity of the Genomic Observatories JRAI of ASSEMBLE Plus, shown in the Basque language channel on 14 December 2019, and on the Spanish language channel the following day.

#### **EMBRC Contact Points**

Node Coordinator: Ibon Cancio

National Liaison Officer: Belén Martín Míguez

Local Liaison officers in each operator:

PiE-UPV/EHU Xabier Lekube (Plentzia)

UVigo: Fiz da Costa (Vigo)

Spanish Members in GA of EMBRC-ERIC:

Inmaculada Figueroa (MICINN)

Jose Manuel García Estévez (EMBRC-ES operators)



## 12.3. EMBRC-FR (FRANCE)

### Service Offer

EMBRC France is operated by Sorbonne University (SU) and the Centre National de la Recherche Scientifique (CNRS), and integrates the service offer of 3 French marine stations: the Institut de la Mer de Villefranche (IMEV), the Station Biologique de Roscoff (SBR) and the Observatoire Océanologique de Banyuls sur Mer (OOB). The service offer includes supporting services as hosting, catering and training, while the core services are classified into: Ecosystem access,; Marine Biological Resources; Experimental Systems and Mesocosms; Technical and Analytical Platforms; Imaging Platforms; Sequencing and Molecular biology; and Biochemical analysis. Some of the services are operated in agreement with other French research infrastructures (RI).

The Ecosystem access is provided by teams of scientific divers in each station, small vessels and research vessels and gear, operated in agreement with the French Oceanographic Fleet (FOF). The access includes deployment of research equipment, underwater experiments, sampling and long-term monitoring environmental data (in agreement with the Littoral and Coastal Research Infrastructure – ILICO).

Marine Biological Resources are organised in a single Biological Resource Center (BRC), a joint governance aimed at harmonising procedures, implementing best practice and sharing expertise among the three stations. The BRC provides micro- and macro-organisms, model organisms, genetically modified organisms, and genetic resources, including those from the culture collections hosted in each station or collected from nearby wild populations.

The experimental systems and facilities are suitable for the rearing of marine organisms for experimental purposes. Wet labs equipped with aquaria of different volumes and circulation systems allow the manipulation of environmental parameters (temperature, salinity, pH); larger-scale experiments can be performed in mesocosms, bioreactors and greenhouses. The laboratories are certified for handling genetically modified organisms, and the staff offers technical assistance related to set-up design and maintenance, isolation of microorganisms for culture or biomass preparation.

Technical platforms are available for unsupervised use or as a service carried out by trained technicians. The proximity of these platforms supports research on marine organisms and ecosystems in sequencing, proteomics, metabolomics, bio-imaging and chemistry. The user's needs on bioinformatics expertise can be provided in collaboration with the Institut Français de Bioinformatique (IFB).

### National infrastructure

EMBRC-France started as a Consortium Agreement between SU and CNRS for a National Infrastructure in Biology and Health, from 2011 to 2019, funded by the Agence Nationale de la Recherche (ANR). An extension and additional funding from ANR has been approved until 2025\*.

\*On 10 January 2020 ANR confirmed 1.6 M€ funding for 30 June 2020 to 30 June 2025.





### **National website and entry point**

The EMBRC-France website, [www.embrc-france.fr](http://www.embrc-france.fr), presents information on EMBRC-France, the stations and the offer, and is the interface with the user. The website has two entry points for the user: a booking section for ordering a specific service, or an email contact for more general questions ([access@embrc-france.fr](mailto:access@embrc-france.fr)). It also contains links to EMBRC-ERIC and the stations' websites. An independent Information System (IS) is linked to the website and manages the information on the users and the platforms, but is accessible only by EMBRC-France selected staff.

A new IS is planned for 2021. It will upgrade the current system by merging the website and the information system, and connecting with other portals and IS used within EMBRC-France. The provider for the new IS was selected in 2019 and the work will start in 2020.

### **Tracking of user statistics**

A brainstorming on user statistics was performed during the preparation of the tender for the new IS. The reporting provided by the IS should include a list of indicators, ranging from user data (gender, institute, scientific field, etc.) to project data (objectives, co-financing, duration, services required, etc.), leading to adequate yearly statistics. The specific list of indicators is still to be defined, but will take into account the indicators required by EMBRC-ERIC, by the operators (SU and CNRS), and by funding institutions (for

instance, ANR). The IS will manage data from all users in a centralised way, in order to simplify the data collection and tracking of user statistics.

User data are collected from different sources, depending on the user profile and access mode. External users are tracked through the current IS, users from specific programs (for instance, ASSEMBLE Plus) are tracked through the access program, and each platform or service provides feedback on internal users or external users that have not used the IS or access programs. EMBRC France has hosted projects funded by ASSEMBLE Plus (47 requests) and CORBEL (1 request). Overall, 81% of the requests have been accepted, and 73% of the accepted requests have been executed during 2019. SBR is the most visited station, while IMEV has hosted the CORBEL project. A small amount of users were early stage researchers (MSc or PhD, 13% of the IP), and none of the projects involved an industrial partner. The majority of users were from Germany (26%), UK and Italy (17% both).

User statistics related to ASSEMBLE Plus, CORBEL and EMBRC-France access program ("appel à projets"), will be analysed in 2020 in order to improve the EMBRC-France openness strategy to new user profiles and communities.

### **National support of RIs**

Since 2010 SU, CNRS and the Ministère de l'Enseignement supérieur, de la Recherche et de l'Innovation (MESRI) have supported

EMBRC-France. In 2019, EMBRC-France has been scored as A+ (maximum score) by an international evaluation panel requested by ANR.

### Other important news

2019 was the last year of the funding programme (2011 to 2019), the end of the operational phase, and there were human resources changes in relevant positions within the EMBRC-France structure. The governance designed in 2018 has started to run, and the different projects and activities, including the service offers, have been ongoing despite the lack of an Executive Director for several months.\*\* EMBRC-France has managed to secure funding from ANR for the next period, 2020 to 2025, and set the basis for consolidating its Management Team with new staff

\*\*Position vacant in February 2020, new recruitment in September 2020.

recruitment and the creation of a Mixed Service Unit between SU and CNRS in 2020. EMBRC-France, specifically the BRC, has advanced on the achievement of a Quality certificate, due in 2020, and in the Access and Benefits Sharing (ABS) framework.

### EMBRC Contact Points

Node Coordinator: Bernard Kloareg  
Liaison Officer: Gemma Giménez Papiol

Management Team : Nathalie Turque,  
Anne-Emmanuelle Kervella,  
Christine Mantecon,  
Emilie Porcher,  
Cécile Cabrésin,  
Raffaella Cattaneo,  
Julie Boeuf



Institut de la Mer de Villefranche (IMEV), Jules Barrois building © David Luquet (EMBRC-FR)

## 12.4. EMBRC-GR (GREECE)

### Service offer

EMBRC Greece is operated by the Institute of Marine Biology, Biotechnology and Aquaculture (IMBBC), one of the three Institutes of the Hellenic Centre for Marine Research (HCMR), as a single access point. In parallel, IMBBC is coordinating the Centre for Marine Biological Resources (CMBR) infrastructure project, which is part of the national roadmap for research infrastructures having explicit reference to, and being based on EMBRC-ERIC. CMBR involves six research institutes and universities, aiming at the improvement of EMBRC-GR and its interaction with three other infrastructures with IMBBC's involvement: ELIXIR-GR, LifeWatch-GR, and BIOIMAGING-GR.

The core services are classified into: Ecosystem access; Marine Biological Resources; Experimental facilities; Technology Platforms; e-services; and expert advice.

The access to Ecosystem is supported by a team of scientific divers and small vessels for coastal operations, and with research vessels and gear (Philia, Ageaon, ROVs), operated as part of HCMR's infrastructure. The access includes mostly underwater experiments and sampling in the coastal areas of Crete.

Marine Biological Resources comprise of mainly DNA collections and marine invertebrate sample series from the Aegean and the Ionian Seas. This biological material is available, but not yet organised as formal collections, something that is within the objectives of the infrastructure. Biological Resources include sampling of species upon request.

The experimental facilities include aquaria, tanks and laboratories for experiments on Mediterranean aquaculture fish species for aquafeed testing, fish reproduction and pathology, as well as dry labs for molecular biology and ecology/taxonomy.

The Technology platforms include Bioassays for testing antibacterial and antioxidant capacity, Imaging (Micro CT imaging, underwater imaging, optical microscopy), Molecular biology and omics (Sanger sequencing, MiSeq-Illumina library construction and sequencing for amplicons, transcriptomes, ddRAD and small genomes, as well as, MinION-Oxford Nanopore library construction and sequencing) and Structural and chemical analysis (targeted analysis of biomolecules and metabolites (e.g phyto-pigments, hormones, biotoxins, fatty acids) with LC-MS/MS and GC-MS).

E-services include Data analysis tools and software (Bioinformatic pipelines for analysis of NGS data on the high performance computer of IMBBC) and Data sets (Micro-CT scans and videos). Expert advice encompasses experimental design for Mediterranean aquaculture (aquaculture, nutrition, diet formulation, reproduction, pathogens) and for Biological sample identification (marine invertebrate taxonomy).

IMBBC, within the framework of the national node, is currently in the process of redefining, evaluating and costing its services. An external advisor will be hired to assist in the production of a roadmap to a fully operational infrastructure, the compilation of the access policy and the infrastructure governance plan.

© Bruno Hesse (EMBRC-FR)



### **National infrastructure**

Greece was the first country, together with France, to sign the MoU for preparing the establishment of a legal structure to operate the European research infrastructure EMBRC (December 2013). EMBRC-GR, a single-operator node, started receiving financial support by in-house sources of IMBBC-GR and subsequently by the Greek General Secretariat of Research and Technology (GSRT) through the project CMBR, which was funded with 4 M€, after a competitive national call for national RI's in October 2017. The project started running in March 2018. It was intended as a 3-year project but its current duration has been prolonged until the end of 2021 following a governmental decision.

### **National website and entry point**

The IT Development Team of HCMR is implementing a fully functioning, responsive and adaptive webpage/portal, which includes technical research on current “state of the art” technologies and tools. This involves implementation of the latest techniques for webmetrics, accessibility and safety with respect to GDPR and WCAG2. Moreover, the webpage is equipped with an internal and efficient Publications Management System. The portal is expected to be fully operational in 2021.

### **Tracking of user statistics**

There is no single system to track users however some installations are currently developing a tracking system (this has already been done for the high performance computer system). The different tracking systems will have to be incorporated into a single system when the portal of the national node becomes fully operational.

There is need for better alignment between

services officially in the list offered as EMBRC services and services that have been traditionally offered before EMBRC-ERIC finalisation of the procedures and evaluations. There is also need for better organisation and fine-tuning of what is offered as an EMBRC service. Only services offered through ASSEMBLE Plus TNA feature in the 2019 report, as doing differently would have required work with researchers that has not been finalised yet. As an example we may report the systematic long-term service offered on production of genotyping of fish populations destined to Aquaculture fish population management and selective breeding by the industry. In addition, the users of the computer cluster that has been opened to external users, mainly collaborators, is easily monitored for each project, as monitoring is inherent to the system. We are currently in the process of evaluating the cost of computer services.

User data are collected from different sources, depending on the user profile and access mode. External users are tracked through the current IS, users from specific programmes (for example, ASSEMBLE Plus) are tracked through the access programme, and each platform or service provides feedback on internal users or external users that have not used the IS or access programmes.

Through CMBR we are buying services to help better organisation of the governance, monitoring access to the infrastructure and building a master plan for the next steps, including harmonisation with EMBRC-ERIC.

Regarding ASSEMBLE Plus, IMBBC-HCMR accommodated 11 users in 2019 within the framework of 7 different projects. For the most part, users requested access to ecosys-



tems (7/7 projects), to experimental facilities-labs (7/7 projects) and to technology platforms (2/7 projects).

### National support of RIs

In-house funds of IMBBC-HCMR were used at the initial stages of setting up EMBRC and the Greek RI “CMBR”, which was based on the participation of IMBBC to EMBRC\_ESFR, was funded in 2017 with 4 M€. It should also be noted that the financial contribution to EMBRC is paid through the ordinary governmental subsidy of HCMR and this is the case of only a few ESFRI RI’s in Greece.

In May 2016 an international evaluation panel judged that CMBR was one of the three (out of 20) RI’s of the National Roadmap for RI’s that met all 9 criteria for contribution to Greek RIS3 priority sectors.

### Other important news

On 25 February CMBR was presented at a day event in Athens, including a verbal presentation and participation by A. Magoulas in a discussion panel about RIs in Greece. In March, the CMBR website was launched. Throughout the year additional personnel joined the CMBR team, including a Project Manager (Ch.Markomanolaki) and Dr.Anastasia Gioti, who is responsible for initiating marine fungal collections and coordinating development of fungal genomics and bioinformatics.

#### EMBRC Contact Points

Node Coordinator: Antonios Magoulas  
Member of CoN: Georgios Kotoulas  
Liaison Officer: Panagiotis Kasapidis

Management Team: C. Markomanolaki  
Melanthia Stavroulaki,  
Emmanouela Panteri,  
George Tsamis,  
Dimitra Mavraki,  
Vasilios Gerovasileiou,  
Georgios Chatzigeorgiou,  
Christina Pavloudi



## 12.5. EMBRC-IL (ISRAEL)

### Service Offer

The IUI is a national collaboration of Israeli universities with a joint campus in Eilat operated by the Hebrew University of Jerusalem. It is the only interuniversity teaching and research facility in Israel, directly reporting to the national Council for Higher Education and receiving much of its operating budget from the Council. All services and infrastructure that are available for research or teaching appear on the EMBRC-ERIC website. The IUI website has a link with a detailed list of infrastructure facilities (<https://bit.ly/3asnPjG>). A detailed Infrastructure Access price list appears on the IUI website. Costing data is kept to determine access costs/unit.

### National infrastructure

The IUI is a national collaboration of Israeli universities and forms EMBRC-Israel. The Israel Ministry of Science and Technology officially recognises the IUI as the national Node.

### National website and entry point

EMBRC-Israel is embedded in the IUI website and appears in the home page banner. The website contains a full list of all its administrative, technical and academic staff (both resident and non-resident) with brief summaries on their research or research interests. The entry point for EMBRC-ERIC projects remains with EMBRC-ERIC headquarters.

### Tracking of user statistics

Requests to IUI for EMBRC access to IUI infrastructure are forwarded to EMBRC-ERIC headquarters. An Excel table is maintained of all accepted ASSEMBLE Plus Users and records are available of accepted Users to the initial ASSEMBLE project (2009-2014). The IUI has an online registration system to record all individual use of infrastructure access such as labs, diving, small boat, research vessel, remote operating vehicle, and accommodation for both research and teaching.

### National support of RIs

In Israel, such infrastructure is supported by the Israel Council for Higher Education; Israel Ministry of Science and Technology; Israel Science Foundation; and Regional centers for development of periphery zones.

In August 2019 the Israeli government had a resolution to establish an international research center for marine biology in Eilat. Due to the national elections, this has not progressed. In October 2019, the IUI opened its new 1400 m<sup>2</sup> lab building. Half of the cost was provided by the Israel Council for Higher Education. Also in October 2019, IUI applied to a Call from the Israel Ministry of Science and Technology to establish a new Center for Mesophotic Coral Ecosystem Research.

The IUI has a jointly-owned Remotely Operated Vehicle (ROV) with a manipulative arm, strobe and camera. This was supported by funds from the Israel Ministry of Science and Technology.

A new academic staff position was introduced at IUI 2019, which is the second new staff position in the last 2 years. This is supported, in part, by the Israel Council for Higher Education.

### Other important news

In October 2019, IUI held its 50th anniversary conference with about 200 international and local participants. A presentation was made to the participants about EMBRC-ERIC and ASSEMBLE Plus.

A 2-million Euro ERC Advanced Grant application was submitted on coral ecosystem resilience in the Gulf of Aqaba and Red Sea. The application is in stage 2 and results will be known shortly. This will provide a major expansion of the Red Sea Simulator robotic aquarium system infrastructure to assess impacts of climate change on the coral reef.

A US-AID Middle-East Regional Cooperation grant was accepted between IUI and its counterpart Marine Science Station Institute in Jordan. The project focuses on measuring the response of engineering species (coral and sea grass) to the combined effect of global and local environmental change in the Gulf of Aqaba.

The EMBRC annual General Assembly met at the IUI from 26-29 November 2019.

The kick-off meeting of the Red Sea Transnational Research Centre (RSTRC) was held in Bern, Switzerland, in March 2019 under the auspices of the Swiss foreign minister. The IUI is a key player in the RSTRC, which is aimed at coordination of cross-border science and monitoring in the Red Sea.

In November 2018, a joint IUI-Leibniz Association (Germany) workshop was held in Berlin, a renewed MoU for 2019-2021 was signed to develop and strengthen the cooperation between the two organisations in the field of marine sciences, methods training (lab, scientific diving), and joint summer/winter schools for PhD students.

**EMBRC Contact Points:**

Node Coordinator: Prof. Jaap van Rijn (also Director of the Interuniversity Institute for Marine Sciences in Eilat (IUI))

Liaison Officer/Access Officer: Dr. Gil Koplowitz

Other individuals involved in EMBRC Node:  
Technical (lab, boat, diving) and administrative personnel

Tanks simulating the Red Sea environment at IUI, Israel (EMBRC-IL)





## 12.6. EMBRC-IT (ITALY)

### National infrastructure

EMBRC Italy is a JRU, recognised by the Ministry for Universities and higher education (MIUR; recognised 29/01/2016, an extension is to be requested before 31/12/2020). The partnership has undergone changes due to internal reorganisation of the CNR and EMBRC-IT will need to request a renewal of the agreement with the new names of the institutes involved (CNR: IAS, IRBIM, ISMAR).

### Service offer

The GA decided that the following items can be actioned as soon as the EMBRC-IT service offer is defined: improve the service provision; foster scientific collaboration and advanced training; and set up an access information system. To this end the GA established a working group (WG) of two staff members per JRU-partner; their task is to analyse services available at JRU-partners and identify those to be included in the EMBRC-IT service offer. Wiebe Kooistra defined five criteria: EMBRC mission; Integrated whole of field access, platforms, facilities, resources; Unique and attractive aspects; Services by service staff using SOPs; User owns results; and Services available (not overbooked), in line with categories used by EMBRC-ERIC. The WG met for two half-day sessions (SZN: 24-25/10/2019) where members compared institutional offers, resolved issues and established offers to be proposed to the GA. The issue of offers which fall outside of marine biology focus was included but Micro-offers were excluded. Also excluded were offers of services by scientists and services provided as SOPs & users owns results. A special GA (Skype 13/11/2019) evaluated the offers and accepted those from Stazione Zoologica Anton Dohrn (SZN) Napoli, OGS Trieste, CoNISMa, U. Padova (Chioggia), U. Camerino (S. Benedetto del Tronto) & U. Urbino (Pesaro), CNR-IAS Capo Granitola & Oristano, CNR-IRBIM Lesina & Messina and CNR-ISMAR Venezia.

The offer of CoNISMa will include the MaRHE

Centre in the Maldives but this is pending approval from the centre's operator, the U. Bicocca (Milan). If approved, MaRHE will request permission to become a direct member of the JRU. This is to be accepted by the JRU EMBRC-IT GA.

### National website and entry point

This is ongoing. The service list of the partners will be translated. The WG will be tasked to write synoptic descriptions of each of their services and provide action photos of these services in function. We are in contact with a web designer who will design the webpages in WordPress. Social pages will be opened on LinkedIn, Instagram, Facebook and Twitter.

### Tracking of user statistics,

An Intern, GianMarco Sbordone, of the GIO-office at SZN, analysed the ASSEMBLE Plus and the first ASSEMBLE Marine transnational access visitors at SZN and compiled a report on the preferred period of visitors, numbers of visitors, their gender, periods of TA, and how many years after their TA they tend to publish their results. Regarding ASSEMBLE Plus visitors to IRBIM Messina and ISMAR Venice (the 3rd parties chosen), there are only a few at present. SZN has not yet received EMBRC-ERIC visitors. At SZN users (in-house and external) who make specific use of the RIMAR (services department) are tracked. These users have to book the services. Other EMBRC-IT institutes will implement similar tracking systems.

### National support of RIs

EMBRC-IT received national support in the form of a national grant supporting ESFRI RI, for EMBRC the "PON PRIMA" grant, ca. 15M€, for infrastructural development of the EMBRC national node. The most relevant part of the implementation will take place at SZN.

### Other important news

The EMBRC-IT General Assembly meeting was held at SZN on 2-3 April 2019. The GA

approved the following budget for JRU EMBRC-IT activities over 2019-2020:

GA meeting in Naples	€ 1.000
Improve service provision	€ 10.000
Foster scientific collaboration	€ 10.000
Foster advanced training	€ 10.000
Set up access info system	€ 3.000
Outreach and in-reach	€ 12.000
EMBRC-ERIC meetings	€ 13.000
Manager	€ 35.000
Total for 2019 into 2020	€ 94.000

A further General Assembly was held via Skype on 13 November 2019. This included a decision on the EMBRC-IT service offer and a proposal of the service offer to EMBRC-ERIC.

The next tasks for completion by service operators include detailing the services offered and cost calculation of the services offered. The next tasks to be accomplished by the EMBRC-IT node include the establishment and implementation of the node website and access system.

EMBRC-IT presented EMBRC-ERIC and ASSEMBLE Plus TA at the following events in 2019:

- 12th Central European Diatomist Symposium Luxembourg 26/03
- MABIK Korea 16/06
- 7th European Phycological Congress 27/08
- Grant Writing Course at SZN 17/10
- Danubius-RI stakeholder event, Rome 20/11

#### EMBRC Contact Points

Node Coordinator: Wiebe Kooistra  
National Liaison Officer: Marco Borra,

Local Liaison officers for each JRU-It partner:

- SZN Andrea Tarallo (Napoli)
- CNR-ISMAR: Lucia Bongiorno (Venezia)
- CNR-IAS: Fabio Badalamenti (Roma)
- CNR-IRBIM: Violetta La Cono (Messina)
- CoNISMa: Michele Scardi (Roma)
- OGS: Mauro Celussi (Trieste)

Full time Infrastructure Manager Andrea Tarallo was appointed for 1 year (until May 2020). Thereafter a new contract to be established.



## 12.7. EMBRC-NO (NORWAY)

### National infrastructure

The contract with the Research Council of Norway was signed on 1 March 2019 and as such is the official date for the start of the project.

### Service offer

EMBRC-NO secretariat has gathered information from the partners to be used on the webpage (when this is ready).

At the Institute of Marine Research, the first tank has been set up, and halibut broodstock are held and will be spawned in the tank. Available species include: halibut, cod, haddock, ballan wrasse, scallops, lobster and live feed organisms (rotifers, Artemia, copepods).

At Nofima, the infrastructure and facilities for cod breeding and rearing are available.

At the Norwegian Institute for Water Research (NIVA) mesocosm facilities for algal cultures have been upgraded in collaboration with the University of Oslo.

At the Norwegian University of Science and Technology, a *Calanus finmarchicus* facility is in place and accessible and the development of a *C. helgolandicus* facility has started.

At the University of Bergen, both *Oikopleura* and *Nematostella* facilities are ready for access. A Sea Lice facility is also, in principle, ready for access, although some delays have been encountered. The facilities at Marine research station Espegrend are ready for use and a new boat is in place.

At the University of Oslo microalgae collections are in place and physical marine culture facilities are under development. A new employee has been working with an algae cultures/database since 1 November in collaboration with NIVA.

At the University of Tromsø an aquaculture station in Kårvika is in operation. New staff have been hired but the facilities are not yet ready for access.

### National website and entry point

The national website is under construction and will soon be available at [embrc-norway.no](http://embrc-norway.no). The Twitter account of EMBRC-NO is @embrc\_no. All partner institutions of EMBRC-NO have their own websites and Twitter accounts. Moreover, several individuals based at the partner institutions regularly tweet on EMBRC-NO related issues.

### National support of RIs

The Research Council of Norway invests heavily in infrastructure and their funding scheme has supported research infrastructure with ca 60 M€ since 2009. This funding helps to build relevant and up-to-date infrastructures, accessible not only to Norwegian research communities and businesses, but also to international research communities, and contributes to research and innovation in areas that are important to society.

The EMBRC-NO secretariat has held meetings with the Research Council of Norway and stressed the need for them to support infrastructure projects during the proposal phase. Furthermore, the use of infrastructures should be recognised in the evaluation of proposals to the Research Council of Norway.



### Other important news

The kick-off meeting of EMBRC-NO was held on 4 September 2019 in Bergen. In total 30 representatives from seven partner organisations across the country came together to present their facilities and to discuss practical issues related to the running of research infrastructures. Representatives from the coordinator, the University of Bergen, and the national funding body, The Research Council of Norway, also attended the meeting.

EMBRC-NO was asked to give a presentation during a visit of the university rector to the Department of Biological Sciences in August 2019. It was the only project represented, thus signifying the importance of this project to the department.

### EMBRC Contact Points

Node Coordinator: Arild Folkvord  
National Liaison Officer: Susanna Pakkasmaa and  
Tatiana Tsagaraki

Local Liaison officers in each operator:  
Institute of Marine Research: Birgitta Norberg  
Nofima: Øyvind J Hansen  
Norwegian Institute for Water Research (NIVA):  
Nikolai Friberg  
Norwegian University of Science and Technology:  
Rolf Erik Olsen  
University of Bergen: Susanna Pakkasmaa and  
Tatiana Tsagaraki  
University of Oslo: Bente Edvardsen  
University of Tromsø: Kim Præbe  
Norwegian Member in GA of EMBRC-ERIC:  
Amund Mågel

Kick-Off of EMBRC-NO with researchers from across Norway



## 12.8. EMBRC-PT (PORTUGAL)

### National infrastructure

In 2016, all Portuguese operators signed a collaboration agreement towards implementing EMBRC-PT. The following year, the consortium received the funding that facilitated the enhancement of the infrastructure which includes the hiring of staff, purchasing equipment and adapting buildings. In 2019, the node prepared for this agreement to come into force in 2020. Although the PT Node of EMBRC-ERIC remains an informal association and is not established as a legal entity, this agreement will allow for the establishment of a management structure in order to contribute to the sustainability of the node in the long term. In addition, an Advisory Board will also be composed of Industry and Academia stakeholders in order to continuously access the quality of the service offer.

### Service offer

The Services offered by the PT Node Operators are described on the PT EMBRC website at <https://www.embrc.pt/>. This website intends to mirror the offer of the EMBRC-ERIC portal, meaning that, with a view to hiring a new Communication Officer and of the announced corporate changes in services presentation, the PT portal will change its structure accordingly.

### National website and entry point

In addition to the PT Node website, <https://www.embrc.pt/>, operators all maintain institutional web pages with greater detail on their activities, facilities and outputs.

### Tracking of user statistics

All users (in-house and external) who make specific use of the services are tracked manually.

### National support of RIs

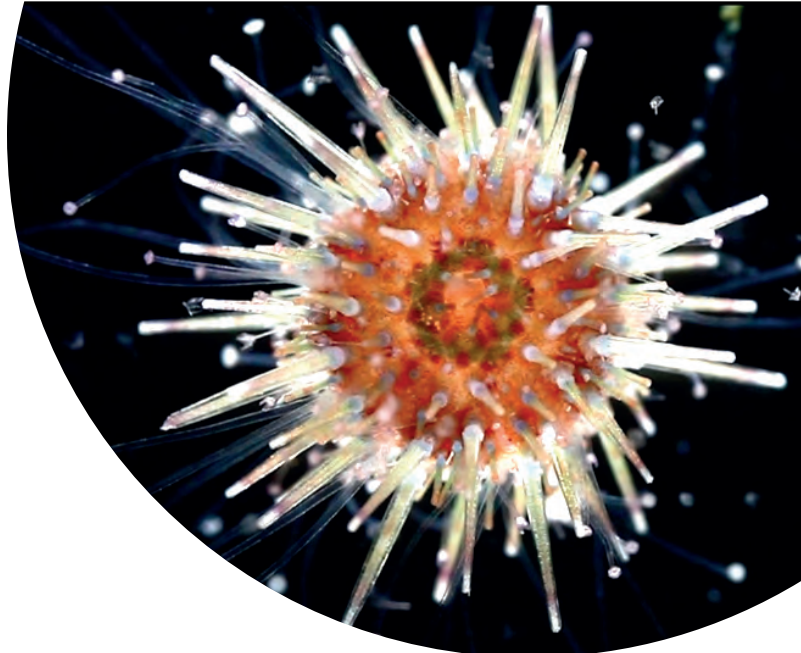
EMBRC-PT had dedicated national support for the enhancement of the infrastructure between 2017 and 2019. Since the collaboration agreement between the operators is

entering into force, in 2019 the node worked on a strategy to have further national support so that the maintenance of equipment and the continuation of scientific staff can be assured in order to mitigate any risks of jeopardising the investment already made during the implementation period.

EMBRC membership fees are paid by the PT operators, using general funds received from core PT research funds of the Portuguese Foundation for Science and Technology.

### EMBRC-PT was presented at the following events in 2019:

- CCMAR participated in 2IN-Investimento e Inovação em Loulé (8 February)
- CCMAR hosted the visit of the EU-LAC Research Infrastructure Working Group (25-27 March)
- CIIMAR Roteiro da Bioeconomia Azul para Portugal – Discussion of the role of the infrastructure EMBRC-PT to the development of the Blue Economy on Portugal, roundtable moderated by Helena Vieira, (12 April)
- CCMAR participated in the European Maritime Day (16-17 May)
- CCMAR participated in the 3rd workshop for the KETmaritime project (26 September)



- Presentation made by ACOI “Algoteca de Coimbra (ACOI), um recurso biológico único” at the conference of the Associação Portuguesa de Algologia Aplicada in Porto (21-22 October)
- Presentation made by ACOI “Algas: Bioldeias de negócio”, presented at Ciclo de Biolnovação at Espaço Inovação Mealhada na Mealhada (25 October)
- CCMAR hosted the workshop Biosensors meet Blue Biotechnology (29-30 November)

#### **EMBRC Contact Points**

Node Coordinator: Adelino Canário (CCMAR)

National Liaison Officer: Daniela Fazenda (CCMAR)

Local Leads in each operator:

CIIMAR: Vitor Vasconcelos

ACOI: Lília Santos

IMAR: Eduardo Isidro



## 12.9. EMBRC-UK (UNITED KINGDOM)

### National infrastructure

All UK operators signed an agreement of collaboration towards implementing EMBRC-ERIC during the preparatory phase. This expired during 2019, and a new agreement has been drawn up and signed by most operators. The other operators are expected to sign in early 2020.

The UK Node of EMBRC-ERIC remains as an informal association, and is not established as a legal entity.

### Service offer

The Services offered by the UK Node Operators are described on the UK EMBRC website at <https://embrc.uk/>.

### National website and entry point

In addition to the UK Node website, <https://embrc.uk/>, operators all maintain institutional web pages with greater detail on their activities, facilities and outputs.

### Tracking of user statistics

All users (in-house and external) who make specific use of the services are tracked manually.

### National support of RIs

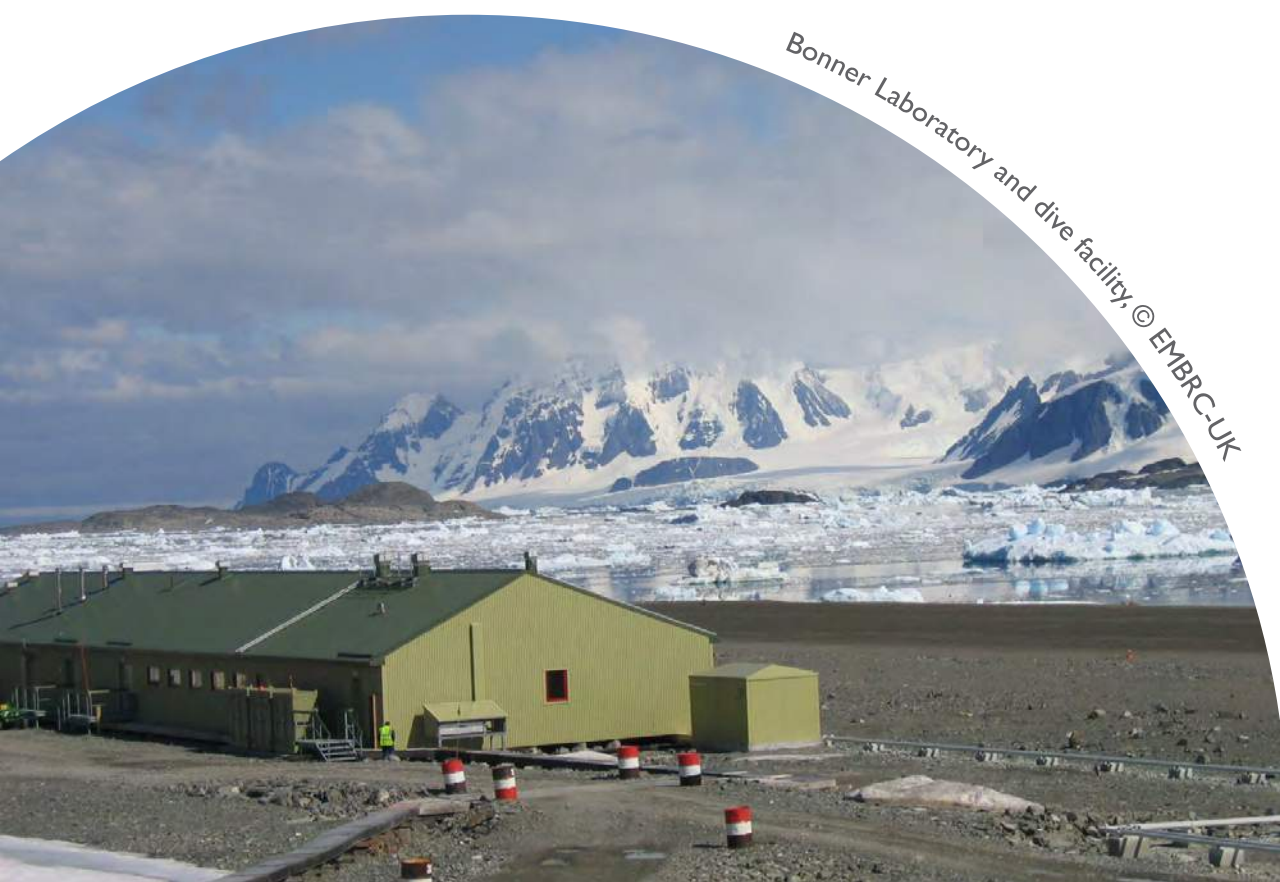
There is no dedicated UK national support for EMBRC-UK. EMBRC membership fees are paid by the UK operators, notionally mainly using general funds received from core UK research funders under UK Research and Innovation, along with surpluses generated from commercial and other enterprise activities.

Most operators are able to access research funds and equipment through UKRI on a competitive basis.

#### EMBRC Contact Points:

Node Coordinator: Nick Owens  
National Liaison Officer: Andronikos Kafas/Ian Davies  
Local Leads in each operator:  
UoStA: David Paterson  
BAS: Beatrix Schlarb-Ridley  
MBA: Jon Parr  
SAMS: Nick Owens  
MSS: Ian Davies

UK Members in GA of EMBRC-ERIC:  
Ian Davies (Marine Scotland)  
David Paterson (University of St Andrews)



Bonner Laboratory and dive facility, © EMBRC-UK



# FINANCES



## 13. FINANCES

### Income

The EMBRC-ERIC budget is financed by nine member countries that contribute in two different ways: through cash contributions and In-Kind contributions. In 2019, in alignment with the budget voted by the General Assembly, the contributions from the member countries amount to:

Membership contributions		2019
<b>Membership fees (amounts in Euros)</b>		
France		87 664
UK		90 622
Italy		77 492
Spain		67 154
Israel		58 885
Belgium		63 340
Norway		79 286
Greece		51 661
Portugal		51 728
<b>Host Premium contribution (amounts in Euros)</b>		
Host Premium cash - France		300 000
Host Premium In-kind - France		260 000
Income transferred by SU for closing implementation phase	-	18 944
Project Income		49 098
Other		54
<b>Total contributions</b>		<b>1 218 040</b>

### Expenses

Financial statements: EMBRC-ERIC's finances are audited every year according to the law in France, where the headquarters has its statutory seat.

The operational costs for the year 2019 were distributed as follows:

Type of costs	2019
Human resources	306 729
Travels	26 734
Consumables	6 816
Services	53 838
Other	3 811
<b>Host Premium contribution</b>	
Host Premium In-kind HR - France	120 000
Host Premium In-kind functioning - France	140 000
<b>Total expenses</b>	<b>657 927</b>

## External funding sources

European project funding is only used to fund projects in which EMBRC is involved:

Project	2019
<b>ERIC FORUM</b>	
Direct personnel costs	3 650
Other direct costs	737
<b>Total</b>	<b>4 387</b>
<b>RI-VIS</b>	
Direct personnel costs	3 697
Other direct costs	2 702
<b>Total</b>	<b>6 399</b>
<b>EOSC-LIFE</b>	
Direct personnel costs	3 513
Other direct costs	1 032
<b>Total</b>	<b>4 545</b>
<b>ASSEMBLE Plus</b>	
Direct personnel costs	32 405
Other direct costs	1 361
<b>Total</b>	<b>33 766</b>
<b>For All Projects</b>	
Direct personnel costs	43 266
Other direct costs	5 832
<b>Total</b>	<b>49 098</b>

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### Photographs and credits

ASSEMBLE Plus

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Marine Biological Association of the UK

Stazione Zoologica Anton Dohrn

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