Deliverable 1.6

Draft of Memorandum of Understanding or other form of formal agreement for the continuity of EMBRIC

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Implementation and operation of cross-cutting services and solutions for clusters of ESFRI

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PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services	

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Abstract

The purpose of this deliverable 1.6, part of Work Package 1 is to provide a general overview of the various outputs of EMBRIC in order to outline the need for establishing a letter of intent between the various stakeholders involved in the project.
The goal of this document is to establish operational alliances beyond the duration of the project. More concretely, the aim is to foster the engagement with companies, to promote access to RI workflows, to develop novel services and to establish project consortia.

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Introduction

The core objective of EMBRIC (European Marine Biological Resource Infrastructure Cluster) is to promote innovation and technology transfer in marine biotechnology in Europe by gathering six Research Infrastructures (RI). Each RI offered the expertise and resources that ensured the delivery of integrated multidisciplinary value chains of services for the exploration of marine bioresources and their sustainable exploitation as sources of biomolecules and/or as whole organisms for various applications.

The objective of WP1 "Management and Communication" were:

(i) To ensure that the operational, administrative and financial tasks of the project are fulfilled according to contractually agreed procedures and to ensure dissemination of the project's objectives, activities and results

(ii) To ensure that the EMBRIC overarching objective is reached.

As the EMBRIC project is coming to its end, it is now time to plan on securing the legacy of this ambitious project. This deliverable outlines the need for establishing a letter of intent, to ensure that the majority of the results obtained during the project are sustainable after the project has ended. It consists of a written commitment of the parties on common terms, including an engagement to prepare, negotiate and execute joint research contracts in the future.

I. EMBRIC overview

No less than 30 partners from 10 EU countries collaborated in this ambitious project. It was a large and diverse consortium of partners, each of which were carefully chosen because of their complementary expertise and skills in a particular field or discipline.

1. Challenges faced

The marine environment accounts for over 90% of the biosphere and harbours a wide biodiversity. Marine organisms have historically been difficult to access and study, but through the recent development of marine laboratories and related biological science research infrastructures (RIs) in Europe, a wider range of marine biodiversity can now be examined and studied in greater detail than ever before.
The seas are a resource that we have to access, study and use sustainably through conservation. Marine biological resources are one of the components of the bioeconomy, allowing technologies to emerge, referred to as marine (blue) biotechnologies.

Marine biotechnology is the key to unlocking the potential of the unique biodiversity of marine organisms. It is rooted in basic research bringing together marine biology, microbiology, physiology, toxicology, systems biology, bioinformatics, omics technologies and chemistry.

Research Infrastructures and their communities in peripheral maritime regions are actors in this challenge. EMBRIC aimed at linking biological and social science research infrastructures (AQUAEXCEL, ELIXIR, EMBRC, MIRRI, EU-OPENSCREEN, RISIS) and building inter-connectivity to develop blue bioeconomy.

2. Overall Approach

EMBRIC was designed to propose integrated multidisciplinary value chains of services for the exploration of marine bioresources and their sustainable exploitation as sources of biomolecules and/or as whole organisms for food (Figure 1).

The cluster united RIs that provide access to the full spectrum of diversity of marine organisms (EMBRC) or are specialized in the provision of specific groups of organisms (MIRRI: prokaryotes and fungi; AQUAEXCEL: finfish). Using these biological resources as raw materials, the cluster developed service-oriented workflows for natural products discovery and for genetic selection in aquaculture. EU-OPENSCREEN contributed its services and expertise in the area of natural products discovery, while AQUAEXCEL did likewise in the aquaculture domain. ELIXIR provided cross-cutting expertise on data services and management. The cluster also included the coordinator of the Social Sciences Integrating Activity project RISIS, specialized in the analysis of innovation ecosystems across Europe, which was involved in analyzing marine biology innovation ecosytems and TT practices, and in providing a methodology to assess the socioeconomic impact of EMBRIC. Case studies were designed to help testing and refining the discovery workflows through Joint Development Activities (JDAs). This internal testing was complemented by providing access to EMBRIC services to external user communities in the second half of the project's lifetime.

The EMBRIC work plan was designed to build, test and refine service provision workflows for applied bioprospection and aquaculture-related research on marine resources (Figure 1).

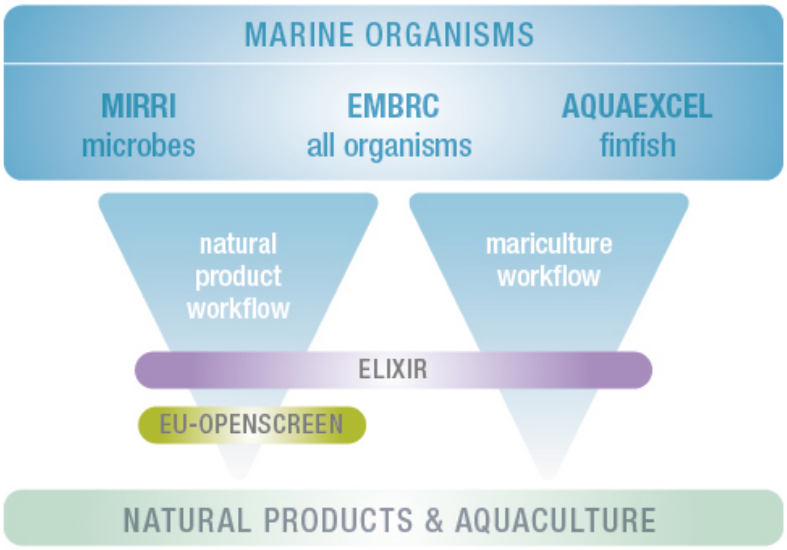

Figure 1. The overall concept of EMBRIC

3. Implementation

The components of the EMBRIC work plan are as follows (Figure 2):

- WP1: management of the EMBRIC project;
- WPs 2-5: technical Work Packages designed to build the cluster mosaic, namely access to marine organisms, discovery and characterization of natural products, data services, and socioeconomic / technology transfer studies;
- WPs 6-8: Joint Development Activities (JDAs) consisting of selected case studies to test and improve the quality of workflows and the connectivity of the cluster;
- WP9: cross-cutting training and knowledge transfer;
- WP10: pilot TA program to open access to cluster services during the second half of the project.

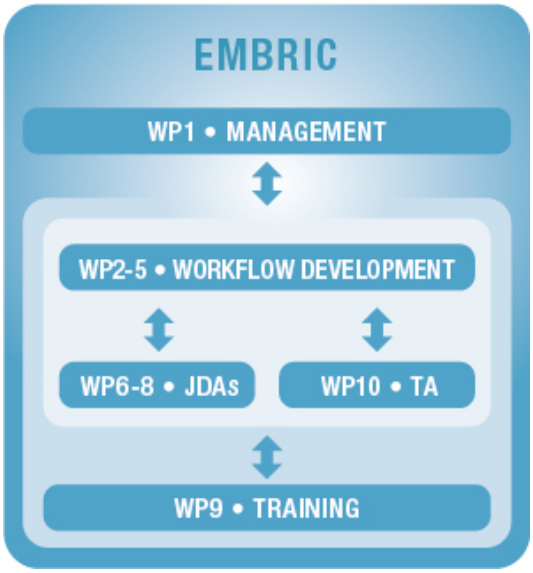

Figure 2. Lay out of EMBRIC Work Packages

II. Main highlights and legacy

1. Main highlights

EMBRIC was designed to accelerate the pace of scientific discovery and innovation from marine bioresources. A panel of activities was developed in order to provide various services to users in the community:

- The establishment of multidisciplinary technological workflows (WPs 2-4) and joint development activities (WPs 6-8) to allow the discovery of new compounds of interest, and the development of genomic resources for selective breeding in aquaculture. A visualization tool was created within WP3 to help identify the expert in the consortium with the targeted expertise.
- The set-up of a training and knowledge transfer (WP9) with the implementation of a training information portal accessible via the project website for now.
- The establishment of pilot transnational access programme to the cluster facilities and services (WP10). A great panel of users had access to the facilities, allowing new collaboration to emerge and existing ones to be strengthened.
- The territorial embedding analysis of marine biology research institutes in peripheral maritime regions, and the elaboration of a methodology to assess the long-term socio-economic impact of EMBRIC as far as possible (WP5).

These scientific activities had led to scientific publications, reports, deliverables and in some cases, patents.

EMBRIC engaged with RDI policy-makers with the aim of tapping the scientific and economic potential of marine biological resources. Two papers were published (one to discuss how EMBRC and its association with other RIs can be used, and the second on EMBRIC's position regarding the Access and Benefit Sharing principles). In parallel, EMBRIC contributed to organize meetings:

- firstly, with maritime regions, with the aim of agreeing on a common initiative to develop a specialized strategy for the blue bioeconomy in their regions:
- secondly, with members of the European Parliament, to discuss the hurdles, the needs and opportunities of a successful European blue bioeconomy.

In conclusion a significant amount of promising and innovative results was obtained by partners within EMBRIC. The cluster as a whole succeeded in its various Work Packages (WP) to achieve - if not all – the main initial goals.

2. Legacy

Arguments in favor of the establishment of a Letter if intent to protect EMBRIC's legacy have emerged from surveys aimed at different stakeholders. Through these surveys, we (1) gathered the opinion of non-experts, policy-makers and industrialists on the Blue Bioeconomy and (2) assessed the usefulness of the project for the EMBRIC partners.

<u>Blue Bioeconomy survey</u>

With this survey we wanted to get a glimpse of what external people think when encountering the term "blue bioeconomy" and whether they have already come across novel products from the sea - for example algae. We wanted to know in which marine resource and marine sector they see the highest potential, where they see the challenges and which policy priorities they would recommend for the coming years. This survey allowed us to identify that the three major sectors with the highest potential are Human Health (65% of the

non-expert public and 50% of the policy-makers interviewed), Food (68% of non-experts) and Energy (50% of policy-makers).

The main factors for blue bioeconomy innovations to be successful on the market are: a more robust regulatory framework, more funding of R&D and a higher acceptance from the public. In fact, 96% of the non-expert public interviewed responded that they would buy products based on algae.
When company managers were asked whether they were satisfied with the current market situation, 71% said no. This shows that needs to be improved and developed with the shared contribution from all stakeholders. As part of the improvement suggested were better communication and dissemination, more funding for R&D and a closer connectivity between companies and researchers were proposed.

Legacy survey

As explained earlier, this survey was designed to obtain an objective feedback on the project and its results. We can say that EMBRIC was an ambitious and successful project with great results and outcomes. For most of the partners involved in EMBRIC, the cluster permitted the creation of new collaborations (via the TNA program for instance), new research projects, develop research activities within partners institutions, consolidate the community around common challenges and goals.

Finally, the survey showed that most of the 30 partners are willing to continue the collaboration established/initiated during EMBRIC.

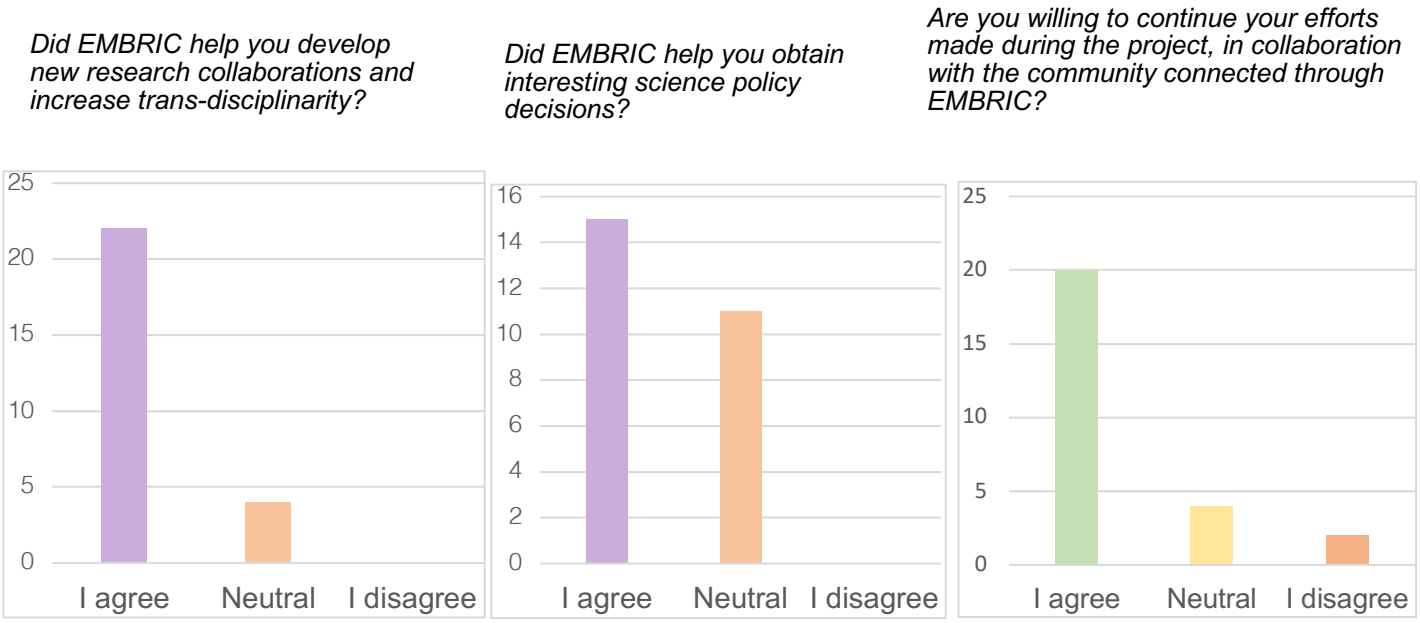

Figure 3. Results of the legacy survey aimed to EMBRIC partners

Based on these surveys it was decided to draft a letter of intent which would engage partners into concrete actions for the continuity of EMBRIC.

III. Draft of Letter of intent between EMBRIC stakeholders.

The scientific stakeholders in EMBRIC, as represented by the pan-European Research Infrastructures (called hereafter "RI") EMBRC, MIRRI, Aqua-Excel, EU-OS, Elixir and RISIS, recognize the need to integrate the various scientific approaches in the field of biology, particularly in the field of marine biology and ecology. These RI are committed to sustain EMBRIC legacy, namely the establishment of a variety of pipelines for fundamental and applied research on marine organisms, the coordination of their technology transfer services to strengthen the connection of science with industry and the involvement with the innovation ecosystems of maritime regions.

Hence, with the objective of accelerating the development of blue bio-economy in Europe and of increasing the global competitiveness of European enterprises of this sector, EMBRC, MIRRI, AquaExcel, EU-OS, Elixir, RISIS agree to:

- Establish operational alliances, including with other cognate research infrastructures, to develop novel services such as genomic observatories and legal clearance for access to marine biodiversity;
- Collectively foster their engagement with companies which use marine bioresources as well as with policy-makers throughout the maritime Regions in Europe;
- Promote access to their workflows for the investigation of natural products and the improvement of aquaculture methods, in view of e.g., explore the links between genotype and phenotype, select elite varieties of marine microbes, plants and animals and tailor cell factories with enhanced performances.

In order to pursue the work initiated within the EMBRIC project, the Parties engage to make their best efforts to complete the activities and policies listed above.

In practice, this will consist of:

- Parties signing a multilateral agreement delineating the perimeter of their service offer and their potential contribution to the development of the blue bio-economy.
- Parties signing bi-lateral agreements to foster joint development activities on specific areas of interest;
- Parties collectively seeking the support of pan-European or global professional organizations, e.g., in drug discovery and the bio-based industry.
- Parties establishing project consortia with the relevant regional, national or European dimensions to secure funding of these activities.

Conclusion

After four years of project, successful collaborations have been established and significant results obtained. Besides, the majority of partners involved, share the same desire to continue the efforts made during the project, in collaboration with the community connected within EMBRIC.
It is now important to ensure the sustainability of these outputs.

That is the purpose of the Letter of intent presented in this document, engaging the scientific stakeholders of EMBRIC into concrete actions continuing EMBRIC legacy. This draft has been validated by the Executive Board members and representatives of some Research Infrastructures partners of EMBRIC. We have the ambition that this document will be duly signed in order to implement the actions described and endorsed.