

B.
Scientific and
Knowledge Transfer
Improvement



SECTION B.1. Research and transfer clusters

Strategic area	Scientific and Knowledge Transfer Improvement
Programme	Research and transfer clusters
Objectives	<p>General objective: to create international Campus research and innovation clusters around strategic thematic areas, to respond to the needs of society and participate in and promote innovative business clusters.</p>
	<p>Since its inception, the CEI-MAR partnership has included a large number of universities, research institutions, technology centres and companies that participate in the activities associated with one or more of the Campus areas of specialisation. It is thus crucial to organise and coordinate the research and transfer conducted by all partners in the major areas that respond to societal needs.</p> <p>This can be achieved through the creation of research clusters to drive innovation, socioeconomic development and, ultimately, employment. These groups will not only be inter-institutional but also multidisciplinary and international, enabling them to address complex problems that require a multi-perspective approach in a global world. Furthermore, coordination enhances individual capacities, endowing the Campus with a vast potential for transformation.</p> <p>It has also been necessary for the Campus to participate in national and international business clusters formed around specific and unique thematic areas, in order to respond globally to society's main challenges, address the problems posed by business innovation and actively contribute to social progress.</p> <p>In light of the above, this programme is aimed at defining and developing international, inter-institutional and multidisciplinary clusters focusing on broad areas of specific interest to the marine, maritime and shipbuilding sectors, to generate research and innovation that responds to society's needs. A further goal is to participate in or create national and international business innovation clusters.</p> <p>This action extends to other marine-themed Campuses with which CEI-MAR has established ties.</p> <p>To achieve this objective, four specific actions have been implemented:</p> <ul style="list-style-type: none"> ▶ Definition and inventory of CEI-MAR research groups, their areas of specialisation and their combined capabilities, to create and develop CEI-MAR research clusters. ▶ Promoting the creation of and participation in business innovation clusters. ▶ CEI-MAR participation in intercampus and international networks.

B.1. RESEARCH AND TRANSFER CLUSTERS



INITIAL OBJECTIVES OF THE 2011 PROPOSAL

The general objective stated in the initial 2011 Campus proposal was to **participate in research clusters thereby enhancing strategic marine research and transfer networks**.

The initial 2011 proposal advocated research and transfer clusters as a means to coordinate the broad fields of marine and maritime research and innovation in which we are strongest. Thus, the application report stated that *this action is aimed at developing research and transfer clusters with the goal of integrating the interests, knowledge, know-how, business culture, working styles and actions of all Campus participants, including partner institutions and other marine-themed Campuses with whom ties have been established*. An important task for CEI-MAR is to create clusters in our strongest international fields of research and transfer, and to propose emerging areas that will meet research and development needs in the coming decades. However, it is also very important to synchronise our work with other marine-themed Campuses with whom there is a history of individual or departmental research collaboration which the Campus of Excellence concept has allowed us to consolidate.

The initial objectives were focused on creating groups, and these have been defined at various levels according to the strategy required. Thus, groups have been classified in order to determine research potential; research training programmes have been grouped according to doctoral research areas; capacities have been catalogued according to strategic areas in order to define transfer potential and then create six large clusters of researchers from different disciplines and institutions, to work together on major problems and future opportunities for innovation. Furthermore, in order to endow the Campus with an organised research structure, it is now part of a network of marine-themed research institutes; this is discussed in more detail in Section B.7.

The Campus has made more progress than initially envisaged, and has been more ambitious as regards creating strategic clusters. Thus, the initial proposal for clusters has now been enhanced, distinguishing between interdisciplinary, inter-institutional research groups in which leading companies participate, which are termed **scientific research clusters**, and business clusters in which CEI-MAR nevertheless plays an important role, which are termed **innovation clusters**.

Consequently, both the main objective and the actions initially proposed in the 2011 report to achieve this objective remain unchanged, but the general objective has been taken further through wider actions that have yielded better results than initially envisaged.



SUMMARY OF WORK ACCOMPLISHED

The International Marine Campus of Excellence, CEI-MAR, represents the main research cluster in southern Europe focusing on marine and maritime research. It is the only marine-themed Campus of Excellence which encompasses not only the traditional areas of marine science and technology but also socioeconomic, legal and cultural areas linked to the sea. In order to benefit society, this vast potential must be organised and coordinated, integrating the value of the Campus in research groups and clusters that clearly define the partnership's capabilities. To this end, the inter-institutional research and transfer committees have conducted an in-depth analysis of the partnership's capabilities, the Campus's socioeconomic environment, and international research funding opportunities.

Research and transfer within the partnership has been divided into two levels. On the one hand, the research potential of the Campus has been defined, classifying partnership research groups and determining their R+D+i capabilities. On the other, national and international transfer clusters have also been defined, in which CEI-MAR is actively involved.



1. CEI-MAR Scientific Research Clusters.

1.1. Defining the research potential of the cluster.

CEI-MAR activities have been grouped into five areas of specialisation. These five areas are driven and coordinated by the inter-institutional research and transfer committees following an analysis of all activities undertaken in partner institutions in the south of Spain (Andalusian Institute of Agricultural and Fisheries Development IFAPA, the Universities of the Algarve UAlg, Huelva UHU, Almeria UAL, Malaga UMA, Granada UGR and Cadiz UCA, the Spanish National Research Council CSIC, the Spanish Royal Naval Observatory ROA, the Spanish Institute of Oceanography IEO, the Naval Hydrographic Institute IHM, and the Centre for Underwater Archaeology CAS) and in north Africa (the Abdelmalek Essaadi University UAE in Morocco).

Some 169 research groups are linked to CEI-MAR, which are distributed across CEI-MAR's areas of specialisation as indicated below (updated on 30 June, 2016¹). The list of groups is available at the following link <http://bit.ly/2c6lold>:

★ AREA 1: Marine Knowledge.

With two areas of research in Oceanography and Marine Biotechnology, and comprising a total of **94** research groups, divided into **67NER + 11PCM + 6BIO + 3PT + 1HUM + 1AGR + 3ICT + 2ESL**.

★ AREA 2: The Sea as a Source of Resources.

With three areas of research in Aquaculture, Fisheries and other Living Marine Resources, Renewable Energy and the Environment, and Tourism, Sport and Health, and comprising a total of **52** research groups, divided into **23NER + 7PCM + 1BIO + 6PT + 2HUM + 6AGR + 3ICT + 4ESL**.

★ AREA 3: Marine Management .

With three areas of research in Water and Coastal Management, Maritime Logistics and Transport, and Protected Natural Areas, and comprising a

total of **60** research groups divided into **28NER + 5PCM + 1BIO + 7PT + 4HUM + 13ESL + 2ICT**.

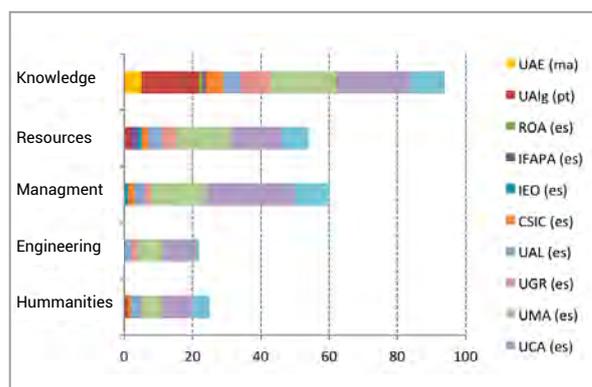
★ AREA 4: Marine Engineering .

With three areas of research in Naval and Offshore Engineering, Design, Production and Software Engineering, and Materials, and comprising a total of **22** research groups, divided into **4NER + 2PCM + 8PT + 1HUM + 7ICT**.

★ AREA 5: The Cultural Value of the sea.

With one area of research in Historical and Maritime Heritage, and comprising a total of **22** research groups divided into **3NER + 1PCM + 1PT + 12HUM + 2ESL + 2ICT + 1HS**.

The graph below gives an overview of the distribution of research groups at each of the CEI-MAR partner institutions by AREA OF SPECIALISATION.



Distribution of CEI-MAR research groups from member institutions across specialisation areas

Note that one of CEI-MAR's values is the interdisciplinary integration of CEI-MAR research groups in postgraduate training and areas of research forming part of doctoral programmes (see Section A.5.). The doctoral programmes adapted to the new Royal Decree (RD 99/2011) are delivered by the partnership's most experienced researchers and other internationally renowned researchers, as well as representatives of companies and authorities associated with the Campus.

Research excellence and internationalisation form integral aspects of the areas of research on doc-

¹ Research groups linked to CEI-MAR have been classified into the following areas: Natural and Environmental Resources (NER); Physics, Chemistry and Mathematics (PCM); Biohealth (BIO); Production Technology (PT); Humanities (HUM); Agronomy (AGR); Economic, Social and Legal Sciences (ESL); Information and Communication Technologies (ICT); Health Sciences (HS).



toral programmes, ensuring teaching quality. For example, 20% of the researchers involved in doctoral programme areas of research are international researchers from over 15 different countries.

1.2. R+D+i capabilities catalogue.

The research groups working in the broad areas described above provide a very clear and representative idea of the Campus's scientific research potential. Nevertheless, to direct this potential towards society's needs, and in particular towards those of the business sector, it was necessary to integrate the activities and capabilities of groups in order to identify the principal agents who could help address a particular problem related to the marine, maritime and shipbuilding sectors. Consequently, R+D+i capacities have been catalogued according to society's innovation needs rather than by research area.

Thus, rather than grouping research teams according to discipline or area of research, the goal has been to define and implement a new organisational structure based on their capabilities, in order to match broad fields of innovation in society and business with the multidisciplinary, inter-institutional research groups and capabilities which are able to address innovation-related problems. This approach has yielded a capabilities catalogue that includes 14 areas. Together with other initiatives in this area, the catalogue has served to create a system of business-oriented CEI-MAR clusters

within the partnership that are described further in Section B.3. As a result, six inter-institutional and interdisciplinary clusters have been created around six broad areas, tasked with meeting business innovation needs and addressing societal challenges, as will be described below in sub-section 1.3 and in greater detail in Section B.3.

The CEI-MAR R+D+i Capabilities Catalogue is divided into broad areas which in turn are subdivided according to transfer areas. Depending on their capabilities, research groups may appear in several areas of research and transfer if they have the capacity to provide solutions to the needs of business and society. Thus research is organised into thematic areas related to marine and maritime business sectors. These areas define the research framework for providing multidisciplinary solutions to companies in the sector.

A brief description of the CEI-MAR R+D+i Capabilities Catalogue is given below, but the full catalogue can be downloaded from the link (access capabilities catalogue).

The catalogue focuses on 14 broad thematic areas as described below:

- **Marine aquaculture:** transfer potential includes fish nutrition and feed, physiological analysis of marine species, pollution, contaminants and remediation of aquatic systems, business economics and innovation in aquaculture.



The catalogue of CEI-MAR capabilities covers 14 thematic areas, for example, marine aquaculture

Marine Aquaculture

GENERAL DESCRIPTION

Aquaculture is the fastest growing food-producing sector, and it already produces 50% of all the fish consumed worldwide.

Over 567 species are currently being farmed, which means there is a considerable genetic diversity both within and across species.

Aquaculture is practised by both poor farmers and large multinational corporations.

Eating seafood is part of the cultural milieu of many human societies. Fish is also a healthy option, with high nutritional value. Seafood is a good source of protein, fat, vitamins, minerals and essential micronutrients.

Aquatic plants, such as algae, are also an important aquacultural resource. They are highly nutritious, can be used as food and also have important industrial functions.

80% of current aquacultural production concerns animal species which are near the bottom of the food chain, such as omnivorous and herbivorous fish and molluscs.

Given the sector's dynamic behaviour over the last 30 years and the progressive decline of capture-fishing, it seems likely that future growth of the fishing sector will rely largely on aquaculture (source: FAO).

Production (TEP), Humanities (HUM), Agri-Food (AGR), Economics, Social and Legal Sciences(SEJ), Information Technology and Communication (ICT) and Health Sciences (CTS).



- ▶ **Underwater archaeology, maritime history and coastal heritage:** transfer potential includes heritage management, coastal, marine and underwater archaeology, cultural and historical studies related to marine issues, development and application of new techniques for preserving historical materials and other studies, and linguistic and literary studies related to marine topics.
- ▶ **Marine bioproducts:** transfer potential includes pharmaceuticals, bioproducts, functional foods, algae and micro-algae, invertebrates and microorganisms as sources of bioproducts.
- ▶ **Port logistics:** areas of transfer include resource optimisation in port logistics, pollution, contaminants and remediation of aquatic systems, and business economics.
- ▶ **Salt marshes and saltworks:** areas of transfer include exploitation of natural resources and land management.
- ▶ **Naval/offshore industry:** transfer potential includes materials analysis for the shipbuilding sector, heat treatment of steel, synthetic diamonds for materials engineering, and reinforced polymers for aeronautics.
- ▶ **Operational oceanography:** transfer potential includes instrument design, environmental monitoring, numerical modelling, marine dynamics, remote sensing, sensor networks, geographic information systems and satellite navigation systems, studies on marine acoustics and digital image processing.
- ▶ **Fisheries:** transfer includes fish nutrition and feed, pollution, contaminants and remediation of aquatic systems, study and evaluation of fishery resources, physiological analysis of marine species and business economics.
- ▶ **Water resources and marine minerals:** potential transfer includes water resources and hydrogeology, hydrological research of

coastal aquifers, seismic surveys, reverse osmosis, and risk analysis of membrane fouling in seawater treatment plants.

- ▶ **Renewable energy:** transfer includes biomass power generation, offshore wind energy, solar energy, tidal power, and legislation, monitoring, evaluation and management related to renewable energies.
- ▶ **Marine risk management:** transfer includes pollution in aquatic systems, noise and air pollution, analysis of marine microorganisms, nuclear energy and radioactivity, environmental management and coastal erosion, coastal dynamics and geological studies.
- ▶ **Land use management:** transfer includes coastal area planning, environmental assessment and management, marine and maritime legislation and land use planning.
- ▶ **Maritime transport:** transfer includes the study and development of new devices, navigation, maritime traffic and safety, and business economics.
- ▶ **Tourism linked to the sea:** transfer potential includes tourism associated with the marine environment, and business economics.

Each of these fields is in turn divided into transfer and innovation areas. In addition, each field has its corresponding list of associated research groups from different CEI-MAR disciplines and institutions.

1.3. Interdisciplinary and inter-institutional research and innovation clusters tasked with addressing societal challenges.

As noted above, as a result of compiling the CEI-MAR R+D+i **Capabilities Catalogue**, defining the partnership's areas of specialisation and capabilities, and of collaboration with companies and business associations (detailed in Section B.4.), six broad interdisciplinary and inter-institutional CEI-MAR research and innovation clus-



ters have been created around the following six broad areas of marine and maritime economic activity: **Living Marine Resources, Port Management and Transport Logistics, Naval and Offshore Industry, Renewable Marine Energy, Health and Sea, and Blue Tourism**. An interdisciplinary group has been formed for each of these broad areas consisting of researchers from different partner institutions and disciplines (from different research groups in different institutions), tasked with working in areas of research and innovation that will contribute to business growth and regional development.

These research and innovation clusters comprise a key element in enhancing the inter-relationship between science, technology and business, as detailed in Section B.3. Note that this action represents a major step forwards in CEI-MAR's commitment to regional development and social progress within its geographical sphere of influence, as it has entailed devoting all of the partnership's coordinated and focused research capabilities and resources to addressing and resolving the problems of innovation and the challenges facing business and society.

2. Innovation Clusters.

Below, we detail CEI-MAR's participation in national and international clusters, starting with the former.

International clusters.

One of our fundamental goals in the strategic area of Improving Science and Transfer has been to form and participate in **international research and innovation clusters** and thus contribute our research and capabilities to the international arena. An essential action in this regard has been to participate in major initiatives within the European research and innovation programme, **HORIZON 2020 (H2020)**, which has also increased our international visibility in the field of innovation. These major initiatives have included **Public-Private Partnerships (PPPs)** and **Joint Technology Initiatives (JTIs)**.

PPPs comprise agreements between the European Commission (EC) and a consortium of companies, universities and research centres. They are directly managed by EC officials, but leadership corresponds to the industrial sector, which proposes the content in accordance with the interests of the public-private consortium. The rules for project participation and funding are included in the **Horizon 2020** working programmes together with other topics within a particular programme. Their main objective is to **coordinate the public and private sectors** in order to jointly develop, implement and fund research and innovation in strategic European and international sectors, for example, advanced manufacturing.

Meanwhile, **JTIs** are legal entities created under Article 171 of the Treaty of Nice (Article 187 of the Treaty of Lisbon). They comprise *Institutional PPPs* between the European Commission and industries specialising in areas relevant to industrial R+D+i, and are aimed at enhancing **collaboration between industry and the public research system**. The part of the **H2020** budget allotted for innovation projects in a specific area is provided by the European Commission to an association called a **Joint Undertaking (JU)**, formed by the European Commission and major (industry-led) stakeholders in this area. In some JTIs, the Member States provide part of the funding and are also involved in management. Thus, their budgets come, in different proportions, from **Horizon 2020**, European industry and Member States.

Much of **H2020** involves industrial initiatives where all partners agree to support the development and implementation of strategically important research and innovation to enhance the competitiveness and industrial leadership of the European Union, or to address specific societal challenges.

Our participation in clusters of this type that have links with the marine and maritime sectors is unquestionably of great interest. Consequently, **we have participated in several large-scale H2020 initiatives:**



- ▶ The **Bio-based Industries (BBI)** JTI: This is a JU formed by the European Commission and the *Bio-based Industries Consortium*. The aspect we are interested in is the use of marine biomass as advanced feedstock for bio-refineries, as well as the use of molecules for pharmaceutical, nutritional or cosmetic purposes.
- ▶ The **Sustainable Process Industry (SPIRE)** PPP. We are interested in the development of innovative technologies that will enable Europe to achieve lasting sustainability in industrial maritime, marine and naval processes such as shipbuilding or fish processing.
- ▶ The **Factories of the Future (FoF)** PPP. We are particularly interested in advanced manufacturing processes and technologies, especially as they relate to the shipbuilding industry (robotic welding, additive manufacturing, etc.).
- ▶ We also participate in the PPP initiative **Vessels for the Future (VftF)**: This is a Maritime Research Association promoted by the *Waterborne European Technology* platform that aspires to become a PPP. We have formed part of this initiative since its inception. Our focus is on the development of innovative technologies for building safer, more efficient and environmentally friendly boats, including, for example, technologies aimed at improving the energy efficiency of boats.
- ▶ We have collaborated in the initiative to create the PPP **Blue Growth (BG)**. The goal of this initiative is to create a PPP linked to H2020 Societal Challenge 2 in relation to the marine environment. We are interested in aquaculture, algal culture, multipurpose platforms and marine biotechnology.

Participation in these clusters is a key component of the partnership's strategy and that of our partner institutions and companies (particularly those on the **CEI-MAR Foundation** board), as a means to improve the success rate of our

applications for European **H2020** projects and to increase the international visibility of our R+D+i capabilities.

National clusters.

Our strategic goals also include the creation and support of **clusters in areas of economic interest to the south of the Iberian Peninsula and northern Morocco**.

In order to lay the groundwork for collaboration in research transfer for business innovation, **CEI-MAR** has worked hard with trade associations, large companies, SMEs, technology centres and port authorities throughout the Campus's geographical sphere of influence.

CEI-MAR has constituted the "*Blue Economy Platform*", a technological platform that is discussed further in Section B.4., which has identified opportunities for innovation, growth and employment related to economic activities in the marine and maritime sectors.

In parallel and complementarily, based on the work of the Universities of the Algarve and Huelva in the project *Knowledge Transfer to Improve Marine Economy in Regions from the Atlantic Area* (KIMERAA), completed in 2014 and forming part of the Atlantic Arc Programme, it has been possible to build strong ties between companies and the scientific community with a focus on marine science and related activities, contributing to the progress of the regional economy in the Atlantic Area. <http://goo.gl/DC4QwS>.

The term Blue Economy refers to all productive and sustainable activity related to the marine and maritime sectors. This is a very important concept within the European Union's strategy for growth, where *Blue Growth* is defined as a long-term strategy to support sustainable growth in the marine and maritime sectors. The strategy acknowledges the importance of the seas and oceans as drivers of the European economy due to the great potential they offer for innovation and growth. This is the Integrated Maritime Policy's contribution to achieving the objectives of the



2020 Strategy for smart, sustainable and inclusive growth. In Europe, the Blue Economy generates 5.4 million jobs and it is estimated that in the coming years it will generate almost two million more. In terms of gross added value, this is currently running at almost 500,000 million euros a year.

The European Commission envisages significant growth in the marine and maritime sectors and has established a specific policy to promote and support this, through various authorities within the European administration. For example, it appears in the **H2020** Research and Innovation Programme, in Societal Challenge 2 (the creation of a Public-Private Partnership on Blue Growth is also being promoted), and in the specific Blue Growth strategy of the European Commission's Directorate-General for Maritime Affairs and Fisheries. This latter consists of three components:

1. Specific measures in the Integrated Maritime Policy (marine knowledge to improve access to information about the sea; maritime spatial planning to ensure effective and sustainable management of marine activities; integrated maritime surveillance to provide the authorities with better information about what happens at sea).
2. Sea basin strategies to ensure a combination of the most effective measures to foster sustainable growth that takes into account regional climatic, oceanographic, economic, cultural and social factors for each of the basins, particularly for the Atlantic Ocean and the Mediterranean Sea basins.
3. Specific activities in the following sectors: aquaculture, coastal tourism, marine biotechnology, ocean energy and seabed mining.

All information on this strategy, communications to Member States from the supporting European Council, and current initiatives can be consulted on this page: <http://goo.gl/ksxGZX>.

The *Blue Economy Platform* has identified and created the following inter-related clusters:

★ **Naval Maritime Cluster.**

The Naval Maritime cluster was created to provide impetus to an industry that was among the first ones in Europe in its field. While it still retains vast potential, it now requires major revitalisation to regain its competitiveness in the international arena. Although its statutes were drawn up with a regional Andalusian nature, the cluster also envisages an international scope (as specifically mentioned in the statutory bases), among other reasons because the shipbuilding market is international and competitiveness can only be improved through internationally competitive technological and organisational innovation.

The cluster was initiated by the Innovation and Development Agency of Andalusia (IDEA) with the direct involvement of the regional government of Andalusia, NAVANTIA, the naval auxiliary industry and CEI-MAR. It was created above all as a trade association, and the Board of Directors includes the president of CEI-MAR's inter-institutional transfer committee, who is the member responsible for innovation, focusing our efforts on stimulating R+D+i within the cluster.

The purpose of the cluster is to "promote, encourage, stimulate and develop the shipbuilding sector in the autonomous region of Andalusia in order to improve the sector's competitiveness and defend its interests". To this end, envisaged activities include: "promoting and encouraging research, development and innovation aimed at revitalising the sector's business base", "encouraging and coordinating participation in national and international collaborative projects", "promoting and developing research collaboration between companies and educational or research institutions".

The cluster has launched an R+D+i plan, coordinated by its R+D+i committee, which as mentioned above is chaired by CEI-MAR. The plan is structured around the concept of Shipyard 4.0, and its working groups include researchers and company staff. The concept of Shipyard 4.0 is that of Industry 4.0 applied to shipbuilding; it



CEI-MAR has encouraged and participates in clusters of interest to the marine-maritime sector, such as the Cadiz Naval Maritime Cluster

thus consists of revolutionising the manufacturing process by introducing advanced manufacturing processes, transforming the shipyard (factory) into a smart factory with a high capacity for adapting to manufacturing needs and processes at all times, supported by new manufacturing systems, automation, the internet of things and intercommunication between systems (link: <http://goo.gl/ZueilP>).

★ **Smart City Cluster.**

CEI-MAR has also joined the *Smart City Cluster*. This is aimed at developing smart cities (better cities) – in our case within the maritime environment – understood as effective, sustainable and comfortable cities, and the CEI-MAR Foundation participates in the following working groups: **Energy, Environment, Innovative Public Procurement, Tourism and Smart Destinations, and E-health and Active Ageing**. Link to news: <http://goo.gl/ZueilP>.

★ **Cluster for the development of renewable marine energy .**

The three main objectives of the European energy policy are competitiveness, supply security and sustainability, while the immediate objectives include obtaining 20% of energy from renewable sources by 2020. One of the renewable energy sources with a high potential for growth is the sea. Some renewable marine energy

sources, such as offshore wind power, have already attained sufficient technological maturity; however, others such as energy from ocean currents (especially in deep water) are still in their infancy as regards technological development. This has prompted CEI-MAR to promote the creation of a group of stakeholders to drive the development of renewable marine energy technologies. ENDESA and ENEL GREEN POWER both play a leadership role in the cluster, which also includes other companies and organisations such as the Technological Corporation of Andalusia and the Advanced Renewable Energy Technology Centre (CTAER).

The focus is on developing innovations that lower the cost of production (from new materials to optimising technologies) and new technologies for deep water ocean currents.

This is discussed more fully in Section B.4. In addition, meetings have been held with other companies with a stake in the sector through the Association of Renewable Marine Energy Producers (APPA Marina) and a working meeting has taken place between the Naval Maritime cluster and the APPA Marina. This initiative has been boosted with the incorporation of ENDESA onto the CEI-MAR Foundation Board, and the company has been tasked with directing CEI-MAR's actions in this field.

★ **"Cadiz Sea Blue Economy" sea salt and aquaculture cluster.**

As a result of the innovation project *Identification of technological and innovation opportunities for industrial revitalisation in the Bay of Cadiz*, led by TECNALIA and including an interdisciplinary group of 20 CEI-MAR researchers, the *Cadiz Sea Blue Economy* cluster has been created as a trade association in which CEI-MAR collaborates. Institutional coordination falls to the president of the inter-institutional knowledge transfer committee. This cluster will be discussed below and in the *Most significant results* section. Link to news: <http://goo.gl/sRjqit>.



CEI-MAR organised I Seminar on the Blue Economy in Andalusia



CEI-MAR's La Esperanza saltworks is an essential resource for the Saltworks and Aquaculture Cluster

3. CEI-MAR participation in intercampus and international networks

Participation in research networks has been actively promoted, and CEI-MAR researchers currently participate in several highly active and consolidated networks. Strengthening these networks is essential because they generate important international initiatives in teaching and R+D+i.

In Europe, CEI-MAR belongs to the EUROMARINE consortium. This new European marine sciences network was created from the merger of three Excellence Networks (EUROCEANS, Marine Genomics Europe and MarBEF) with the aim of acting as a "bottom-up" organisation to address the concerns and ideas of the European marine science community.

In Latin America, CEI-MAR continues to actively participate in the IBERMAR Integrated Coastal Management Network. In addition, Campus researchers participate in directing highly specialised international marine research programmes such as the *Joint Programming Initiative: Healthy and productive Seas and Oceans* (JPI-Oceans), *Land Ocean Interactions in the Coastal Zone* (LOICZ) and Eurofleets (<http://goo.gl/6HCP51>).

At national level, CEI-MAR actively participates in the marine-themed Campus of Excellence in Southern Europe network, CEIMARNET. The network aspires to become a European benchmark

in marine education, research and transfer. It encompasses 14 universities and public research institutions (PRIs) from the Campus do Mar (incorporating all universities in Galicia and north Portugal), the Campus Mare Nostrum (comprising universities from the autonomous region of Murcia), the Canary Islands Atlantic-Tricontinental Campus (made up of universities on the Canary Islands) and CEI-MAR (coastal universities in Andalucía, southern Portugal and northern Morocco and PRIs). CEI-MAR currently holds the presidency of the network. Link to news: <http://goo.gl/FBZ4TA>.

We participate in eight highly active working groups. In particular, a complete catalogue of the network's infrastructures is being compiled, coordinated by CEI-MAR; as with the CEI-MAR agreement on shared use of infrastructures detailed in Section B.7., the intention is to extend this initiative to the CEIMARNET network (link to news: <http://goo.gl/yB0TB3>). In 2016, work has been ongoing on four other joint CEIMARNET projects: (1) Design of a joint project for stimulating entrepreneurship and employability in the marine sector: this project is in preparation and will be submitted to a forthcoming call issued by the Biodiversity Foundation; (2) Preparation of an international mobility project for students and teaching staff in the field of marine studies; (3) Implementation of the CEIMARNET network; and (4) Development of a joint publication on the impact of CIEs on their member universities and surrounding regions.



The **CEIMARNET** network has proposed to the Conference of Vice Chancellors of Spanish Universities (Spanish acronym CRUE) that one of the vice chancellors participating in the network (in this case, the president of the **CEI·MAR** partnership) should also participate in the Commission for Coordination and Monitoring of Oceanographic Vessel Activities (Spanish acronym COCSABO) of the Spanish Ministry of Economy and Competitiveness. The presence of a Spanish University representative on this commission has facilitated shared use of ships managed by the COCSABO for **CEIMARNET** Campus teaching and research, either with a fixed annual schedule for teaching activities, or leveraging ship transits.



ROLE OF PARTNERSHIP MEMBERS

Actions have been planned, driven and coordinated by the inter-institutional committees for research and transfer and all partner institutions have been actively involved.

Defining the research potential of the Campus has entailed supplying data, organising research activities, incorporating groups into diverse areas of specialisation and subsequent integration in the doctorate programme, and accurately defining the capabilities of each research team. This task has required the participation not only of institutional representatives but also dozens of researchers from all institutions, representing their research groups.

As regards interdisciplinary and inter-institutional research and innovation clusters tasked with addressing societal challenges, the most important milestone was the creation of six multidisciplinary and inter-institutional **CEI·MAR** research clusters: Living Marine Resources, Port Management and Transport Logistics, Naval and Offshore Industry, Renewable Marine Energy, Health and Sea, and Blue Tourism. Researchers from all **CEI·MAR** partner institutions are involved in each thematic area, each of them playing the

same important role in the partnership. Each of the clusters is coordinated by researchers from different institutions, ensuring that work is coordinated and collaborative. All Campus member institutions have worked equally hard to create these clusters. They have organised cluster definition seminars, attended by companies in the sector and researchers, in order to clearly define each of the clusters. These face to face meetings have been held at various locations, facilitating the attendance of all researchers.

As regards the innovation clusters, the impetus provided by the inter-institutional transfer committee and the participation of Campus researchers in thematic clusters has been fundamental.



MOST SIGNIFICANT RESULTS

- ▶ Identification and grouping of **CEI·MAR** research groups linked to the 5 areas of specialisation (marine knowledge, the sea as a resource, marine management, marine engineering and the cultural value of the sea) defined at the outset of the project and their integration in the partnership's doctoral programmes.
- ▶ Production of the R+D+i capabilities catalogue identifying the Campus's potential for transfer to address societal challenges.
- ▶ Creation and full operation of the six interdisciplinary and inter-institutional research clusters in the broad areas of: Living Marine Resources, Port Management and Transport Logistics, Naval and Offshore Industry, Renewable Marine Energy, Health and Sea, and Blue Tourism.
- ▶ Incorporation into European clusters linked to Horizon 2020 (PPPs and JTI): *Bio-based Industries, Sustainable Process Industry, Factories of the Future, Vessels for the Future.*



- ▶ Collaboration in the initiative to create the PPP *Blue Growth (BG)*.
- ▶ Creation and full operation of the Cadiz Naval Maritime cluster. Signing of the "Agreement to Create the Naval Maritime Cluster of Cadiz", on 19 December 2014, in the presence of the President of Andalusian Government (link to news: <http://goo.gl/o5RpC8>). Signing of the Statute and constitutional documents of the Cluster as an association on 4 August 2015 (link to news: <http://goo.gl/1shTaU>).
- ▶ Creation of a network of companies and other entities focused on the "Development of Renewable Marine Energy". Promoted by CEI-MAR, this initiative was launched in 2013 with the participation of ABENGOA SEA POWER, ENDESA, CTAER, the Technological Corporation of Andalusia (CTA) and TECNALIA. This work led to the incorporation of ENDESA onto the board of the CEI-MAR Foundation and agreement by the company to direct this area.
- ▶ Creation of the *Cadiz Sea Blue Economy Sea Salt and Aquaculture cluster*: based on an innovation project *Identification of opportunities in the technological and innovation fields for the reindustrialisation of the Bay of Cadiz*, led by TECNALIA and in which we participate with an interdisciplinary group of 20 CEI-MAR researchers, a strictly business cluster has been created in which CEI-MAR collaborates.
- ▶ Incorporation of CEI-MAR in the Smart City Cluster. Link to news: <http://goo.gl/C7O4eV>.
- ▶ CEI-MAR participation, together with the *Bay of Cadiz Foundation for Economic Development*, in joint actions conducted within the framework of the European project *Atlantic Blue Tech* and aimed at promoting the business potential of marine bio-resources, in line with the European *Blue Growth* strategy.
- ▶ Creation of the CEIMARNET network and active participation in the network's working groups.
- ▶ Participation of the President of the CEI-MAR partnership in the Commission for Coordination and Monitoring of Oceanographic Vessel Activities (COCSABO) of the Spanish Ministry of Economy and Competitiveness.
- ▶ CEI-MAR participation in the EUROMARINE network since its inauguration in April 2014, when priority actions were established for the first years of operation that coincided exactly with CEI-MAR's challenges and priorities, namely: (1) Identification of new scientific challenges; (2) European doctoral schools; (3) Sharing scientific infrastructures; and (4) Staff mobility. In 2015 and 2016, CEI-MAR has also been represented at the general assemblies of EUROMARINE held in Naples (Italy) and Olhão (Portugal), respectively.
- ▶ Creation of the *Regional Focal Centre*, tasked with general coordination of the IBERMAR network. All National Focal Centres (previously national coordinators of the IBERMAR network) will be eligible to assume this responsibility in rotation. The National Focal Centre designated the Regional Focal Centre will be required to organise the next Ibero-American Congress on Integrated Management of Coastal Areas, coordinate the weekly publication of IBERMAR bulletins, and manage the Network's website. Network coordination, previously carried out by CEI-MAR (National Focal Centre for Spain and Portugal) has now unanimously passed to the Agência Brasileira de Gerenciamento Costeiro (Forum do Mar).
- ▶ Establishment, enhancement and consolidation of national IBERMAR groups through the respective nodes and National Focal Centres.



Official signing for Cadiz Naval Maritime Cluster, presided by the President of the Andalusian Regional Government

- ▶ Extension of the **IBERMAR** Network through the creation of ties with new groups from other countries. New members of the **IBERMAR** Network: Honduras, Peru, Guatemala, Nicaragua and El Salvador. Pending: Ecuador and Venezuela.
- ▶ Definition and execution of a regional/sub-regional strategy for postgraduate education (inter-university cooperation to create new Master's degrees and doctoral programmes) and training in Integrated Coastal Management within the **IBERMAR** sphere of influence.



INTERNATIONALISATION ACTIONS

Internationalisation is a key component of all actions and areas of work, as is clearly evident in our participation in the European clusters *Bio-based Industries, Sustainable Process Industry, Factories of the Future*, and *Vessels for the Future*. Our membership has involved participation in all events organised by these partners, including meetings, working groups and the intervention organised in the definition of the corresponding biannual H2020 *working programmes*. **CEI-MAR** has participated in meetings with the Centre for Industrial Technological Development to prepare working programmes for H2020 Societal Challenge 2 and to define the



CEI-MAR encouraged the creation of the Marine Spanish Campus of Excellence network CEIMARNET. The image shows the inauguration ceremony at the convention centre in Cádiz

Spanish proposal for the *Blue Growth* PPP initiative. **CEI-MAR** participation in H2020 and European projects will be detailed in Section B.3.

Our activities in innovation clusters are also directed towards internationalisation. For example, within the Naval Maritime cluster we have participated in international meetings with companies and innovation agents from other countries, including the *Technical Study Day on the Turkish shipbuilding sector*, the *Direct trade mission Scotland Naval and Offshore Wind sector*, and the upcoming meeting of the cluster with the South Norway European Office and companies in the region, scheduled for 25 and 26 October.

International visibility of the interdisciplinary and inter-institutional research and innovation clusters, tasked with addressing societal challenges, has been achieved through researchers participation in:

- ▶ H2020 public-private partnerships;
- ▶ Innovation clusters; international research programmes such as "Joint Programming Initiative Oceans -JPI-Oceans" - (<http://goo.gl/cUIa0j>), Land Ocean Interactions in the Coastal Zone - (LOICZ)- (<http://goo.gl/Ek3CCF>), and Eurofleets (<http://goo.gl/QFW8vC>), among others;
- ▶ The **EUOMARINE** and **IBERMAR** networks;



▶ Work in collaboration with international researchers on CEI·MAR research and doctoral programmes;

▶ Participation in various forums to promote international cooperation, such as the *European Forum for Innovation in Marine Bio-Resources* (29 April 2015).



MOST SIGNIFICANT DEVIATIONS FROM INITIAL OBJECTIVES

There has been no deviation from the initial objectives for this action; on the contrary, very positive progress has been achieved in enriching these objectives, yielding better results than those initially proposed.



SECTION B.2. Plan for Advanced Research: Plan reSEArch

Strategic area	Scientific and Knowledge Transfer Improvement
Programme	General plan for promoting research and knowledge transfer: Plan reSEArch
Objectives	<p>General Objective: Development of a Programme to boost research at CEI-MAR Institutions, by strengthening and increasing the quality and scientific productivity of CEI-MAR researchers, increasing the international projection of research activities and hiring highly-qualified scientific-technical personnel.</p>



The main strength of the CEI-MAR partnership lies in the research potential of its members. The Campus has over 1500 researchers carrying out their research on marine-maritime topics, with strong international ties and high potential in the development of research projects with international impact.

In order to boost the research level of the Campus, as well as to increase the competitiveness of the research teams, the Interinstitutional Research Commission of the Campus has worked to create a CEI-MAR Plan for Advanced Research called the Plan "reSEArch".

In the initial CEI-MAR report, this section included aspects of knowledge transfer and innovation that have been eliminated from the Plan reSEArch, and therefore are not mentioned in this present section. These aspects were worked on by the Interinstitutional Knowledge Transfer Commission and are dealt with in other sections of this area focused specifically on aspects of knowledge transfer to the business sector (B1, B3, B4 and B6). Therefore it has been decided to limit this section to those aspects aimed at boosting research.

The general objective proposed can be broken down into the specific objectives of the Plan reSEArch which are listed below:

- ▶ Promote doctorate studies at the International Doctorate School of Marine Studies (EIDEMAR).
- ▶ Incentivize international cooperation through a mobility grant programme.
- ▶ Attract/retain international talent through the support and promotion of CEI-MAR research studies.
- ▶ Promote participation in national and European competitive projects.
- ▶ Develop a collection of CEI-MAR monographs that project the research potential of the Campus to all of society at both national and international levels.

INITIAL OBJECTIVES OF THE 2011 PROPOSAL

The General Objectives proposed in the initial de 2011 report were: **Boost research, knowledge transfer and innovation in the institutions belong-**

ing to CEI-MAR promoting the hiring and advanced training of highly qualified technical and scientific personnel.

This general objective was to increase the level of scientific excellence, dynamism and the capacity to approach new lines of work and im-



prove those already existing in CEI-MAR, as well as to contribute to greater market orientation and to increase interaction with the business sector. This objective has a clear link with training aspects at a doctorate level and is therefore closely connected to the activities of the International Doctorate School of Marine Studies EIDEMAR (Section A.5). Furthermore, in order to achieve this objective it is necessary to integrate programmes to promote research as well as to improve the indicators of quality and productivity of the research and its internationalization, with programmes to promote relationships between the Campus and the socio-economic sector and the structuring of this sector, invigorating the Science-Enterprise system. Those aspects focused on boosting and promoting research are discussed in this present section and all the remaining programmes, more related to knowledge transfer and connection with society, are described in detail in Sections B. 3 to B. 6, as well as in C1.

More specifically, and to summarise, the programmes developed to achieve the general objective proposed in the initial report have been divided into several sections and are classified in the following way:

Advanced Research Plan reSEArch. All of the programmes in this plan aimed at improving the research of the Partnership are described in this present section B2. Programmes have been run to promote the realization of doctoral theses, to support the organization of international events and the edition of monographs, as well as a programme to attract/retain research talent through the creation of a fund to promote the incorporation of high-level researchers.

CEI-MAR Knowledge Transfer and Valorisation Unit. Described in the different sections focusing on those aspects of knowledge transfer and development belonging to the Science-Technology-Enterprise sector. Sections B. 3, B. 4 and B. 6.



CEI-MAR predoctoral contracts have enabled advanced training for young researchers

SUMMARY OF WORK ACCOMPLISHED

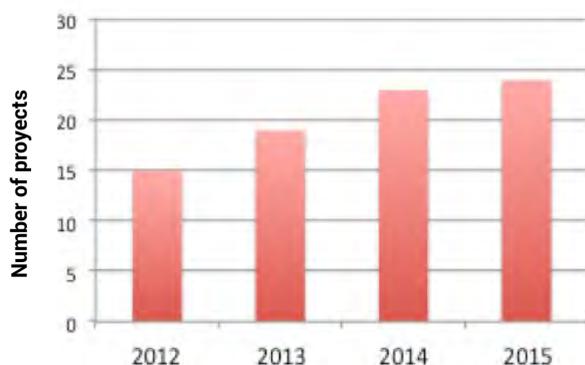
Since its creation, CEI-MAR has continuously promoted and supported research of excellence in the maritime and marine fields. Of the initial funding of 4.8M€ obtained by the Campus of Excellence for all the partnership, approximately 45% has been allocated to promoting and boosting research, both in running the Plan reSEArch and in purchasing scientific infrastructure (Section B7). We must add to this amount other funds contributed by the participating institutions, each according to their means, by including in their internal research programmes, specific programmes oriented to the CEI-MAR Campus of Excellence. From the first year, the Interinstitutional Research Commission defined development policies within an Advanced Research Plan that is known as the Plan reSEArch. Programmes are included within this plan to promote and support research of excellence in the Campus, with the aim of improving the quality of research and productivity indicators. As well as this yearly investment of public and private funding destined to R+D+I and private investment in Spain for projects with Universities, CEI-MAR has managed to obtain public and private funding to continue improving the indicators of the partnership in those aspects relating to research, knowledge transfer and innovation.



One of the most important milestones in this consolidation and improvement of research activities has been the creation of the **CEI-MAR** Foundation as the driving force in the achievement of regional, national and international research and knowledge transfer projects. The main objective, with an eye to the future, is the creation of a **"Projects Office"** within the **CEI-MAR** Foundation, taking advantage of the detailed knowledge of the research potential of the members of **CEI-MAR**, and promoting the creation of highly competitive partnerships (see Section B. 1) that apply to grant offers with the highest possible chances of success.

The **internationalization of research** is of special importance to the Campus. For this reason, the Foundation has worked hard to promote the realization of international joint projects. The total number of international **CEI-MAR** projects, between 2012 and June 2016, was 63, of which 28 are projects in consortiums with businesses (in Section B3 we make reference to these projects with businesses). The steady increase in the number of European projects obtained and carried out must be noted; while at the time of the Campus's application (2010/2011) 5 European projects were being carried out, in 2015/2016 48 are underway, which is an increase of 960%.

We must add to the projects referred to above, other projects pending evaluation, among which are those listed below presented by the **CEI-MAR Foundation**:



Evolution of the number of State R+D+i Plan projects from CEI-MAR institutions in the rounds of grants from 2012 to 2015

★ **Title: Social Relationship between Fish School and a Swarm of Bioinspired Underwater Robots**

Name of the Project: SEA-SHEPHERD

Grant scheme: H2020-FETOPEN 2016-2017.

Consortium: Agenzia Nazionale per le Nuove Tecnologie, L'Energie e lo Sviluppo Economico sostenibile (Italy), Technological Aquiculture Centre of Andalucía Foundation CTAQUA, Zentrum fuer Telematik e. V., Università Degli Studi di Roma Torvergata and **CEI-MAR** Foundation

★ **Title: Intelligent specialization, detection of barriers and the development of marine renewable energies and aquiculture in the cross-border area of the Euro-region Alentejo-Algarve-Andalucía.**

Name of the Project: BLUE-SMART-ENERGY

Grant scheme: INTERREG V A España Portugal (POCTEP)

Consortium: AREAL – Agência Regional de Energia e Ambiente do Algarve, UAlg – University of the Algarve, CTAER –Advanced Technological Centre for Renewable Energies Foundation, **CEI-MAR** Foundation and APEH –Provincial Energy Agency of Huelva.

★ **Title: Promoting entrepreneurial spirit in the marine field in the Cross-border Region Andalucía-South of Portugal.**

Name of the Project: EMPREAZUL

Grant scheme: INTERREG V A España Portugal (POCTEP)

Consortium: Associação Centro de Incubação de Empresas de Base Tecnológica Vasco da Gama - Sines Tecnopolo, Bay of Cadiz Foundation for economic development, Technological Aquiculture Centre of Andalucía Foundation (CTAQUA), University of the Algarve (UAlg) and **CEI-MAR** Foundation.

★ **Title: Ecolabel for sustainable tourism conflicts and boosting natural conservation.**

Name of the Project: BlueBoard

Grant scheme: INTERREG Atlántico 2016.

Consortium: Surf rider Foundation Europe, Technological Centre for Marine Sciences (CETECIMA), Surfers Against Sewage, Local council of Las Palmas de Gran Canarias, Terras do Infante-Associação de Municípios (ATI), **CEI-MAR** Foundation and Plymouth University (PU).



★ **Title: Cities at the edge of the sea, improving accessibility to our Cultural and natural resources.**

Name of the Project: SEACITIES

Grant scheme: INTERREG Atlántico 2016.

Consortium: CEEI Bahía de Cadiz, Municipality of Cascais, CEI-MAR Foundation, Ville de Brest, Faculdade de Ciências da University of Lisbon, Nimbus, Institut Technolaloccta Chorcal, Scottish Association for Marine Science and Prifysgol Abertawe.

As far as national projects are concerned, since the creation of the CEI-MAR Campus of Excellence at the end of 2011, there has been a notable increase in the number of projects carried out by CEI-MAR institutions under the grant schemes of the National R+D+I Plan (since 2013, the State Plan). In the following graph, it can be seen that the successful participation of different CEI-MAR institutions in project grant schemes belonging to the State Plan shows a clear increasing trend in marine-maritime topics, growing from 15 projects led by CEI-MAR researchers in 2012 to 24 projects in 2015.

Of the 81 projects of the National Plan obtained under these 4 grant offers, below are highlighted some of those that show the change in mentality of the researchers, incorporating personnel from the different participating institutions into the research teams, with clear CEI-MAR spirit:

- ▶ INTEGRATED OCEANOGRAPHY OF THE GULF OF CADIZ IN A CHANGING GLOBAL CLIMATE (OCAL). Grant scheme: State Plan (Challenges of Society 2014). Funding: 330,000 €. Participating institutions: University of Cadiz, Spanish Oceanography Institute, ICMAN-CSIC (Each one of the 3 is leading a subproject in this coordinated project)
- ▶ Name of the project: MESOSCALE AND SUBMESOSCALE PROCESSES IN THE STRAIT OF GIBRALTAR: THE TRAFALGAR-ALBORAN CONNECTION (MEGAN). Grant scheme: State Plan (Challenges of Society 2013). Funding: 272,250 €. Par-

ticipating institutions: University of Cadiz, University of Malaga, ICMAN-CSIC, Navy Hydrographic Institute.

- ▶ Name of the project: FROM THE ATLANTIC TO THE TYRRHENIAN SEA. ANDALUSIAN AND LUSITANIAN ATLANTIC PORTS AND THEIR COMMERCIAL RELATIONSHIP WITH OSTIA ANTICA. Grant scheme: State Plan (Challenges of Society 2014). Funding: 70.000 €. Participating institutions: University of Huelva, University of Cadiz, CAS-IAPH
- ▶ Name of the project: IMPACT OF THE INTRUSIONS OF AFRICAN DUST IN ACTIVE CARBON FLOWS IN THE ALBORAN SEA. Grant scheme: National R+D+I Plan 2012. Funding: 109,980 €. Participating institutions: University of Malaga and the Spanish Oceanography Institute.
- ▶ Name of the project: BIOTECHNOLOGY OF MARINE DINOFLAGELLATES. PRODUCTION AND VALORISATION OF THEIR BIOMASS ON A PILOT SCALE. Grant scheme: State Plan R+D+I (Challenges of Society 2014). Funding: 129,000 €. Participating institutions: University of Almeria and CSIC.

The role of the Foundation in national and regional projects is also of great importance, promoting interrelationships between researchers as well as correctly defining the topics being studied and directing them at the challenges of society. As an example, in the following lines, some of the projects presented by the CEI-MAR Foundation at a national level and that are still pending resolution are listed:

★ **Coastal Ecoports**

Consortium: CEI-MAR Foundation

Grant scheme: Concession of grants, on a competitive basis, for activities carried out under the framework of the collaboration agreement between the Biodiversity Foundation and Ecoembes to fight against marine waste.



Image of the Workshop on Aquaculture from the Southern Atlantic Coast held in Huelva



Image of the Andalusian Council of Higher Education which approved €4.8 M of funding for CEI-MAR in January 2012.

★ **Promotion of Biodiversity through sustainable management of saltworks in Red Natura 2000.**

Consortium: CTAQUA and **CEI-MAR Foundation**

Grant scheme: Concession of Biodiversity Foundation grants, on a competitive basis, to carry out activities in the fields of land, coastal and marine biodiversity 2016.

★ **Secrets of the sea**

Partners: Centre of Subaquatic Archaeology, **CEI-MAR Foundation** and University of Cadiz.

Grant scheme: BIODIVERSITY FOUNDATION. Grant scheme of the Biodiversity Foundation, on a competitive basis, to carry out activities in the fields of land, coastal and marine biodiversity, climate change and environmental quality 2015.

The most important result of the research activities funded is the increase in scientific productivity in important journals over the last few years, that shows an increase in the number of important publications, nearly 1500, from the five year period 2005-2010 (3850 documents) to the period 2011-2016 (5213 documents), and that has shown a continuously increasing trend since the beginning of the Campus. Moreover, these publications are demonstrated to be of high quality as their average normalised impact over the last 5 years is over 1, which indicates that it is above average. An exhaustive analysis of this can be seen in Section B.5. This gives the **CEI-MAR** partnership production figures similar to those of the

top Spanish University in the Shanghai Ranking, the University of Barcelona, that in the 2011-16 period, produced 2480 documents.

The improvement of these indicators of **CEI-MAR** scientific publications has meant working to aggregate and coordinate research, one of the main objectives of the Research Plan, **Plan reSEARCH**. This plan aims to consolidate the level of excellence of marine-maritime research and has been funded both with the Campus's internal funds, and with contributions from the institutions belonging to the partnership (purpose-oriented, within their own scope, to **CEI-MAR**). The plan can be divided into five main areas:

As has been mentioned previously, this plan has received a high percentage of the funding obtained by the partnership, to which the funds contributed by the participating institutions included in their internal plans must be added. A breakdown of funds per programme is listed below.

In the following lines, the programmes and results obtained in each of the areas of the Plan are described.

1. - Promotion of the realization of doctorate studies in the International Doctorate School of Marine Studies (EIDEMAR)

Grants have been offered for the realization of Doctoral Theses in **CEI-MAR** (pre-doctoral contracts), offering a total of **23 pre-doctoral contracts** financed by **CEI-MAR** in the 2012-2016 period. Of these,

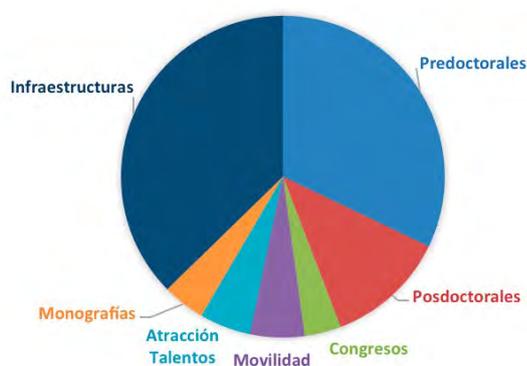
¹ Source Scopus – Author Search



7 are pre-doctoral contracts for industrial doctoral theses co-financed by companies whose details are provided in Section B3. The other 16 pre-doctoral contracts are distributed in the following way:

- ▶ 5 pre-doctoral contracts aimed at the strategic lines of the Campus of Excellence.
- ▶ 4 pre-doctoral contracts for each of the four **EIDEMAR** Doctorate Programmes (1 per programme).
- ▶ 4 pre-doctoral contracts financed by the University of Cadiz within its Internal Research Plan.
- ▶ 2 pre-doctoral contracts financed by the University of Malaga (UMA).
- ▶ 1 pre-doctoral contract financed by the Joint Doctorate Programme between **EIDEMAR** and the University of Ferrara "Earth and Marine Sciences" (EMAS).

In the following lines, the main characteristics of each of the contracts are detailed. All of the contracts are aimed towards **internationalization**, with the possibility of carrying out internships at international centres of prestige being promoted in the area of mobility, with the aim of obtaining an **international mention for the Doctoral Thesis**. All of the contracts are announced internationally, allowing the participation of researchers trained at institutions not belonging to the partnership, therefore promoting connections with entities from outside the Campus.



Distribution of investment from CEI-MAR reSEArch Plan by percentage

1.1- Five pre-doctoral contracts for the realization of Doctoral Theses in **strategic research lines** of the Campus. The offer was open to anyone belonging to the partnership, with both the curriculum vitae of the applicant and the director(s) of the project being taken into consideration. The offer can be seen at the following link <http://bit.ly/1jAh0VN>. Applications were endorsed by researchers from all over the partnership, with up to five candidates competing for each place. The beneficiaries of these contracts are the following. Resolution made by the Interinstitutional Research Commission on the 20th March 2014 at <http://bit.ly/2c7HjH0>:

- ▶ Priority line "Multitrophic marine farming and new aquaculture technologies"

Beneficiary: Juan Luis Fuentes Cordero.
Thesis title: Description, production and use in multitrophic marine farming of an extremophilic microalga and the associated microbial consortium.

Directors: Carlos Vilches (UHU) and M. González del Valle (company BIOAVAN SL).

- ▶ Priority line "Marine ecosystems and social benefits in a changing global scenery"

Beneficiary: Elisa Martí Morales.
Thesis title: Neuston distribution in the global ocean.

Directors: Carlos M. Duarte (University Western Australia) and Andrés Cózar (UCA).



Diagram of CEI-MAR's reSEArch Plan's five action programmes



- ▶ Priority line "Renewable energies of marine origin"

Beneficiary: M^a Concepción Calero Quesada.

Thesis title: Physical characterization of the marine areas of the south of the Iberian peninsula of special anthropogenic interest, with emphasis on the extraction of energy from the marine currents through the application of hydrodynamics models.

Directors: Jesús García Lafuente (UMA) and Miguel Bruno (UCA).

- ▶ Priority line "Intelligent, sustainable and integrated maritime transport"

Beneficiary: Manuel Cobos Budia.

Thesis title: Model for the study of the consequences of the interventions in the Guadalquivir estuary.

Directors: Asunción Baquerizo (UGR) and Miguel Ángel Losada (UGR).

- ▶ Priority line "Marine tourism and cultural heritage"

Beneficiary: M^a Ángeles Pascual Sánchez.

Thesis title: Milling in the Roman Halieutic world. New contributions of experimental archaeology and archaeometry to the marine cultural heritage of the Frenum Gaditanum.

Directors: Darío Bernal (UCA) and Salvador Domínguez Bella (UCA).

1.2 Four pre-doctoral contracts for the realization of Doctoral Theses in **each of the Doctorate Programmes** of the Doctoral School **EIDEMAR**. Offer aimed at each of the lines of the doctorate programmes of the Doctoral School: Marine Science and Technology, Management and Conservation of the Sea, Maritime Archaeology and History and Marine Resources. Both the merits of the candidate and the strategic value for **CEI·MAR** were taken into consideration. A total of 35 candidates applied for the grants. The offer can be downloaded at <http://bit.ly/2c42sno> and the final resolution at <http://bit.ly/2bFkPe7>.

- ▶ DP Marine Science and Technology: Sara Frau (Italy).

Thesis title: Embryo and larvae rhythms: the role of environmental cycles in the development of sole.

Directors: José Antonio Muñoz Cueto (UCA) and Jack Falcon (Observatoire Oceanologique de Banyuls, CNRS-*Universite Pierre et Marie Curie* Paris VI, Banyuls, France).

- ▶ DP Management and Conservation of the Sea: Maria De Andres Garcia (Spain).

Thesis title: Towards a world of coastal cities. Implications for the management of coastal and marine ecosystems.

Directors: Juan Manuel Barragán (UCA) and Marinez Scherer (University Federal de Santa Catarina, Florianopolis, Brazil).

- ▶ DP Maritime Archaeology and History: Lil-yam Padrón (Cuba).

Thesis title: The maritime defence of Eastern Cuba in the 18th Century. The indigenous contribution of San Pablo de Jiguaní and San Luis de los Cayenes.

Directors: Manuel Bustos (UCA) and Alberto Gullón (UCA).

- ▶ DP Marine Resources: Laura Cadiz Barrera (Spain).

Thesis title: The physiological role of vasotocin and isotocin on the well-being of teleostei of interest in aquaculture: sea bream and St. Peter's fish.

Directors: Juan Fuentes (University of Algarve) and Juan Miguel Mancera (UCA).

1.3.- Four pre-doctoral contracts for the realization of Doctoral Theses on topics of the Campus within the University of Cadiz's Internal Research Plan. Grant scheme associated with research projects stemming from the University of Cadiz's internal plan. Four pre-doctoral contracts were offered



associated with four projects of the state plan. See offer on <http://bit.ly/2cifCh0>. The final resolution can be consulted on <http://bit.ly/2bYcYuR>.

- ▶ Pre-doctoral contract associated with the project AGL2013-48835-C2-1-R "Application of molecular tools for the detection and attenuation of stress situations in the farming of sea bream (*Sparus aurata*); Director: Juan Miguel Mancera Romero. Marine Resources Doctorate Programme. Beneficiary: Ismael Jerez Cepa
- ▶ Pre-doctoral contract associated with the project AGL2013-49027-C3-2-R "Embryo and larvae rhythms: the role of environmental cycles in the development/determination/sexual differentiation reproduction of the sole". Director: José Antonio Muñoz Cueto. Marine Science and Technology Doctorate Programme. Beneficiary: Guillaume Henri Loentgen
- ▶ Pre-doctoral contract associated with the project CTM2013-43857-R "Micro-ecology and biogeochemistry of the intertidal sediments of the Bay of Cadiz: physical forcing caused by the tidal cycle and the photoperiod". Director: Alfonso Corzo Rodríguez. Marine Science and Technology Doctorate Programme. Beneficiary: Sara Haro Páez.
- ▶ Pre-doctoral contract associated with the project CTM2013-47549-P "New systems for the determination of trace metals in waters based on capillary microsystems. Pooling efficiency, application and sustainability". Director: Carlos Moreno Aguilar. Marine Science and Technology Doctorate Programme. Beneficiary: Macarena Silva García.

1.4.- Grant for the realization of Doctoral Thesis in CEI-MAR-UMA (Pre-doctoral contract).

- ▶ A pre-doctoral contract has been awarded for the realization of a Doctoral Thesis on topics of the Campus, with the title "Study

and analysis of the interspecific competition between two estuary Rhodophyta species", associated with the project CTM2011- 24007 "Function of macroalgae in the biogeochemical cycle of carbon in the coastal arctic system: Incorporation, assimilation and regulation mechanisms ". Director: Raquel Carmona Fernández. PhD student: Raquel Sánchez de Pedro Crespo. (Link: <http://goo.gl/5eXOsD>).

1.5.- Grant for the realization of a Doctoral Thesis in EIDEMAR within the joint International and Interuniversity doctorate programme of "Earth and Marine Sciences" EMAS with the University of Ferrara. Offer at the following link <http://bit.ly/2bFl1tG>.

- ▶ **INTERNATIONAL** Thesis. Title of the work "Morphodynamic study of the San Pedro river mouth and the Sancti Petri sandspit using unmanned aerial vehicles (UAVs)". Directors: Laura del Río Rodríguez and Javier Benavente González. PhD student: Lara Talavera Madrigal.

2.- Excellence Mobility to Centres of International Relevance programme.

Offer of pre-doctoral research internships in centres of international relevance in marine-maritime research for EIDEMAR pre-doctoral students. To this end, CEI-MAR has established, for those granted pre-doctoral contracts, the **Excellence Mobility to Centres of International Relevance** programme. The main objective is to obtain an **International Mention** for all of the Doctoral Theses.

Grant scheme for those hired on **pre-doctoral contracts** and who are carrying out their research in EIDEMAR. The programme provides funding for up to 2 internships at international centres of prestige. The procedure appears in the pre-doctoral offer and after the beneficiary's application, the funds necessary to carry out the activity are allocated.



Mobility programme for pre-doctoral students to centres of excellence in the UMA. **10 grants** to move to centres of international excellence: <http://goo.gl/HLtxkh>. The final resolution can be consulted at the following link <http://bit.ly/2bYek94>. The internships took place at prestigious Institutions such as the *Consiglio Nazionale delle Ricerche Istituto di Nanotecnologia* in Italy, or the University of Rockstock in Germany.

3.- Programme to support the organization of singular Congresses and Workshops.

Incentives for research involving international cooperation to strengthen relationships with researchers and institutions in the international field through the organization of relevant congresses and *workshops*.

During the eligible period, numerous congresses, workshops and meetings on strategic topics have taken place. The topics have covered all of the **CEI-MAR** disciplines ordered according to specialization areas ranging from marine resources to the cultural value of the sea. These congresses have been held all over the **CEI-MAR** territory, and on some occasions outside our borders. The organization and running of 22 congresses and international conferences must be mentioned, among which the following may be highlighted: The congress of the *Association for the Sciences of Limnology and Oceanography* (ASLO) in Granada (2015), (Link to the news item: <http://goo.gl/YdfcHr>) the *Marine Sciences* congress in Cadiz(2012), (Link to the news item a: <http://goo.gl/kamuBS>), the national aquiculture congress in Huelva (2015), or the congress on contents of *Amphorae* in Cadiz (2015) (Link to the news item: <http://goo.gl/CHQy8n>). In the Most Significant Results section these are described in more detail.

4.- Programme for the attraction and retention of Research Talent.

This Programme supports the **CEI-MAR** research career through economic grants to allow the hi-



Doctorate students and researchers from University of Almería and CEIMAR at a workshop on microalgae held in Baja California (Méjico)

ring of high level doctors, young doctors or help with the co-funding of other external grant schemes aimed at the attraction of talent. In some cases, this programme has been funded by the partnership as well as by the participating institutions' own funds.

The main grant scheme oriented towards the hiring of prestigious researchers was launched with the aim of intensifying research activity in the strategic lines of the Campus. The line of subaquatic archaeology must be highlighted as it is the first and only of its kind in Spain. The grant schemes can be consulted at <http://bit.ly/2bFpYHK>. After an analysis of the merits of the candidates, Dr. D. Xavier Nieto has been hired, a well-known expert on the subject, whose main activity has been that of directing this specific line to discover and optimize valuable subaquatic heritage. Dr. Xavier Nieto Prieto is one of the best-known figures, both nationally and internationally on this subject and the former director of ARQUA, the Centre of Subaquatic Archaeology of Catalonia and current consultant member of the UNESCO in nautical and subaquatic archaeology. Since being hired, he has set up this research line, provided the oceanographic vessel UCADIZ with the tools necessary to carry out subaquatic archaeology (see Section B7) and set up a Masters' in subaquatic archaeology with excellent participation results (see Section A5).



Plenary session of the congress ASLO-2015, held in the convention centre of Granada in February 2015

In addition to this grant scheme for the hiring of a distinguished researcher, in accordance with the Science Law, the following programmes have been launched oriented towards the attraction of post-doctoral researchers with an excellent research curriculum to carry out their research activities within the partnership.

4.1. Programme of grants for co-funding the incorporation of researchers from the grant schemes Marie Curie, Juan de la Cierva or Ramón y Cajal in CEI-MAR centres.

A budget allocation has been set aside to incentivize the hiring of post-doctoral researchers selected in the grant schemes belonging to the State Plan that require co-funding from the recipient institutions, and which in 2016 will include the CEI-MAR institutions. The objective is to promote the incorporation of these researchers into the partnership by raising the salary level defined by the organising body and making CEI-MAR institutions more attractive. Up to the present time, a Juan de la Cierva contract to join the Spanish Oceanography Institute (IEO) has been funded. The resolution of the incorporation of the Ramón y Cajal grant scheme is expected at the end of September, to define the co-funding of these researchers.



CEIMAR hosted relevant meetings and workshops. In the image, announcing poster of the jellyfish proliferation workshop held in Cadiz in the framework of UE Perseus project

4.2. Programme of post-doctoral contracts in the CEI-MAR field:

Grant offer of 3 post-doctoral contracts, resolved in June 2016, and in which the beneficiaries were (<http://goo.gl/BrmYPN>):

- ▶ Emilio García Robledo. Project: "Microbial communities in intertidal zones: "Metabolic and community-level responses in a fluctuating environment". Linked to the UCA. H-index 8 for a total of 22 documents with a total of 203 citations. 61 co-authorships, having worked with researchers from Denmark, Austria, Costa Rica, the United Kingdom, the United States and Chile². <http://bit.ly/2bLrO5i>.
- ▶ Mar Benavides Gorostegui. Project: "The effect of denitrification and nitrous oxide (N₂O) emissions on carbon storage: an assessment in the coastal wetlands of Southern Spain". Linked to UGR. H-index 5, for a total of 12 documents with a total of 43 citations. A total of 56 co-authorships, working with researchers from New Caledonia, Germany, France, Morocco, the United States, Australia, Belgium, Chile, Israel, Holland and the Russian Federation². <http://bit.ly/2bNRnIJ>.
- ▶ Enrique González Ortegón. Project: "Transfer of trace metals in the trophic network of the Gulf of Cadiz: biogeochemical implica-



tions". Linked to ICMAN-CSIC. H-index 11, for a total of 26 documents with a total of 346 citations and 35 co-authorships with researchers from the United Kingdom, Switzerland, the United States, Canada, France and Germany². <http://bit.ly/2bZyGgj>.

- ▶ During the 2013-2014 period, 2 post-doctoral contracts have been carried out in strategic CEI-MAR lines, linked to the University of Almeria (<http://goo.gl/HOQQyY>), and in which the beneficiaries were:
- ▶ Ma Isabel Sáez Casado "Detection of the expression of genes conveyed by ADNP vectors administered orally as opposed to intramuscularly in sea bream (*Sparus aurata*) as a vaccination strategy in fish". H-index 4 for a total of 13 publications and with a total of 42 citations¹.
- ▶ Lucía Santa Cruz Calvo "Development of in vitro Models applicable to the evaluation of nutrients and prebiotics". H-index 2 for a total of 3 documents and with a total of 15 citations².
- ▶ Grant offer of 2 post-doctoral contracts in CEI-MAR lines, linked to the University of Cadiz and funded by their internal Plan. The grant offer has two stages, an initial stage in which the best research group is selected and a second stage to select the best possible candidate. Currently the first stage has been resolved and the second stage is still open. Link to the offer at <http://bit.ly/2bo5i4i>.

4.3. Talent Hub Scheme in the CEI-MAR framework.

In the last few years, the Andalusian Regional Government has launched a programme for the attraction of talent, called **Talent Hub**, to the Andalusian Autonomous Community. The institutions that may be destinations for the Beneficiaries are those that belong to one of the Campuses of Excellence of the Andalusian Autonomous Community, among which is CEI-MAR ([\[j057\]\(#\)\). In the case of CEI-MAR, over the two years this programme has been run, 15 doctors have been beneficiaries:](http://bit.ly/2bO-</p>
</div>
<div data-bbox=)

- ▶ Antonio Pedrera Parias. CSIC. H-index 11 for a total of 66 documents, cited 465 times.
- ▶ M. José Salamanca Marín. University of Cadiz. H-index 7 for a total of 10 documents, cited on 110 occasions.
- ▶ Javier Miguel Ochando Pulido. University of Granada. H-index 12 for a total of 50 documents cited a total of 474 times.
- ▶ Raúl Pérez Ortega. University of Almeria. H-index 5 for a total of 12 documents, cited a total of 101 times.
- ▶ José Luis Varela Fuentes. University of Cadiz. H-index 6 for a total of 11 documents, cited a total of 88 times.
- ▶ Marta Rodrigo Gamiz. CSIC. H-index 8 for a total of 16 documents, cited 240 times.
- ▶ Nicolás García Robinson. University of Granada. H-index 7 for a total of 30 documents, cited 140 times.
- ▶ Carlos Ruiz Cánovas. University of Huelva. H-index 12 for a total of 29 documents, cited a total of 774 times.
- ▶ Julio Alberto Soria Lara. University of Granada. H-index 4 for a total of 17 documents, cited 24 times.
- ▶ Sara Marañón Jiménez. University of Granada. H-index 7 for a total of 8 documents, cited 118 times.
- ▶ Miguel Padiál Molina. University of Granada. H-index 10 de a total of 29 documents, cited 252 times.
- ▶ Antonio Jurado Navas. University of Malaga. H-index 8 for a total of 26 documents, cited a total of 167 times.
- ▶ Virginia Ariadna Aparicio García Molina. University of Granada. H-index 12 for a total of 69 documents, cited a total of 464 times.

² Fuente Scopus – Author Search



- ▶ Gustavo Adolfo Cordero Bueso. University of Cadiz. H-index 6 for a total of 9 documents, cited a total of 93 times.
- ▶ César González Pascual. University of Granada. H-index 15 for a total of 60 documents, cited 692 times.

5.- Edition of the editorial collection of Monographs of Excellence CEI-MAR

CEI-MAR has created an editorial line of CEI-MAR monographs with the aim of reflecting the research potential of the partnership both to the international scientific community and the social environment. Work has been carried out on a wide range of topics including all the areas of specialization of the Campus. This activity has been worked on intensively and, up to the present, around twenty monographs have been published, covering topics from history or archaeology to biology, marine ecology or gastronomy. A more detailed description of these monographs is included in Section B5 (<http://bit.ly/21YuKAn>).

As has been previously mentioned, the promotion programme is completed with programmes oriented towards knowledge transfer and innovation which will be described further on in Sections B3, B4 and B6. In these sections, programmes are described for pre-doctoral contracts for realising doctoral theses in businesses and

the programme of awards for knowledge transfer and innovation, oriented towards businesses, among others.



ROLE OF MEMBERS OF THE PARTNERSHIP

The Plan reSEArch has been jointly drawn up and executed by all of the partnership and coordinated by the Interinstitutional Research Commission with the technical support of the central coordination office of the Campus. The conception of the plan took place in the heart of the afore-mentioned commission in which all of the members of the partnership participate. This commission has been responsible for drawing up and launching the grant offers in the different grant schemes since its constitution. Finally, the resolution of each of the grant offers has been made in meetings held by the commission. Therefore, the partnership's grant offers have been directed by all of the participating institutions, giving cohesion to the Plan reSEArch, and running it as an authentic plan belonging to the partnership.

As may be observed, the beneficiaries of the grant schemes of the Plan are distributed over all the territory of the CEI-MAR institutions. All of the grant offers have been competitive between all of the researchers of the Consortium in order to thereby reinforce the unity of the partnership,

B.2. PLAN FOR ADVANCED RESEARCH: PLAN RESEARCH



The 19 titles in the CEI-MAR Monographs collection are already prominent in marine-maritime studies



The prestigious scientist, Daniel Pauly, gave a CEI-MAR conference of excellence after being made doctor Honoris Causa by the UCA



with researchers from each of the institutions competing in terms of curriculum.

In the case of the grant schemes for pre-doctoral and post-doctoral contracts, the grant schemes carried out by each of the Universities belonging to the partnership have been added to the general CEI·MAR grant schemes. The same can be said of the grants and benefits awarded to improve and continue the research career, where it was the Campus itself that supported the grant schemes economically when co-funding was necessary.

As far as the organization of events is concerned, there is a clear distribution among members of the partnership, the same as occurs with the improvement of infrastructures that is described in Section B7.

Members play a vital role in applications for projects that are being carried out from within the Foundation in order to make the applications more competitive. The number of groups from the different institutions participating in the projects that are being applied for with the coordination of the partnership has increased over the last few years, and this is a guarantee of the success of the work to be carried out by the Campus over the next few years.

• • • • •

MOST SIGNIFICANT RESULTS

The most significant results of these programmes include an improvement in scientific production and in the success rate for the carrying out of both national and European projects by the partnership. Focusing on the programmes carried out, those that will bear fruit over the next few years must be highlighted:

- ▶ 63 international projects. Those European projects which were carried out with companies are discussed in Section B3.
- ▶ Participation in 81 projects included in the national plan since 2012, with this number

growing annually. In *Summary of work carried out* some of these are listed.

- ▶ 23 pre-doctoral contracts to carry out doctoral theses in the EIDEMAR School, listed in the epigraph *Summary of work carried out*.
- ▶ 7 high-level post-doctoral contracts for members of the partnership (UAL, UCA, UGR and ICMAN-CSIC) also listed in *Summary of work carried out*.
- ▶ Mobility grants for the recipients of the partnership's pre-doctoral contracts.
- ▶ 19 edited monographs from the CEI·MAR series.
- ▶ Organization and running of 22 congresses and international conferences, among which the following can be highlighted:
 - ◊ IV Congress MARTECH 2011 (International *Workshop* on Marine Technology). Cadiz, September 2011 <http://bit.ly/2bO3IIP>.
 - ◊ Marine Sciences Conference. Cadiz, January 2012. Organization of the Conference and of the three congresses that made it up + 1 Meeting of the IGBP Network (in total over 1000 participants) <http://bit.ly/2bP7wuN>:
 - ◊ III International Symposium of Marine Sciences
 - ◊ XVI Iberian Seminar on Marine Chemistry
 - ◊ First Ibero-American Congress on Management of Coastal Areas
 - ◊ Meeting of the Iberian Group of the IGBP (International Geosphere-Biosphere Program) V Ibero-American Forum on Marine Resources and Aquaculture. Cadiz, November 2012. <http://bit.ly/2cePI0N>
 - ◊ Scientific meeting on Archaeomala-



cology of the Iberian Peninsula. Cadiz, December 2012 <http://bit.ly/2cqjdtl>.

- ◇ Numerical Analysis Course and Conference: Cadiz Numérica 2013. Puerto Real, Cadiz, June 2013. <http://bit.ly/2bW48LR>.
- ◇ Aquiculture Knowledge Transfer Conference held in IFAPA, Centre "El Toruño", October 2013 Organized by IFAPA-CEI-MAR and UCA-CEI-MAR. <http://bit.ly/2bW3D4f>
- ◇ 3rd Joint Seminar on Environment and Climate Change. Hispano-Russian meeting between the Federal University of Siberia and CEI-MAR from the 7th to the 10th of July 2013, Cadiz. (Link to the programme: <http://goo.gl/wGBIaR>; Link to the news item: <http://goo.gl/nQbYOL>).
- ◇ Tsunami Congress *Mathematical Modelling for Tsunami Early Warning Systems. An International Conference*, del 9th to the 14th of April 2014, Malaga. (Link to the Congress website (<http://goo.gl/XCHw6B>)). Organized by UMA-CEI-MAR.
- ◇ General assembly of the European Project MACUMBA "Marine microorganisms: Cultivation methods for improving their biotechnological applications", from the 21st to the 27th of September 2014, organized by UCA-CEI-MAR. <http://bit.ly/2ck6pBG>
- ◇ Annual meeting of two ICES workgroups (*International Council for the Exploration of the Sea*). The work groups are (1) Integral ecosystemic evaluation for the Baltic Sea (WGIAB) (2) Integral ecosystemic evaluation for the Barents Sea (WGIBAR), organized by IEO-CEI-MAR (link to the news item <http://goo.gl/Wo4xF8>).
- ◇ National Aquiculture Congress, organized by UHU-CEI-MAR and IFAPA-CEI-MAR Agua del Pino, 2015. <http://bit.ly/2bO50YJ>
- ◇ ASLO Congress *Association for the Sciences of Limnology and Oceanography*, ASLO-Granada 2015 organized by UGR-CEI-MAR, from the 22nd to the 27th of February 2015. This is an extremely high level international congress, in which CEI-MAR participates very actively, with researchers from CEI-MAR acting as global event officials (Isabel Reche UGR), as members of the scientific committee (Fidel Echevarría, UCA) and as members of the local organizing committee (various from UGR, UCA, UMA and IC-MAN-CSIC). <http://bit.ly/2bO6131>.
- ◇ Collaboration with the European project Perseus International Workshop: International Workshop "Coming to grips with the jellyfish phenomenon in the Southern European and other Seas: research to the rescue of coastal managers." <http://goo.gl/Ullwvg>
- ◇ Roman Amphorae Contents International Interactive Conference (October 2015) see link on <http://goo.gl/CH-Qy8n>
- ◇ The risk of seaquakes off the Iberian Peninsula in the light of the catastrophe of the 1st of November 1755 (October 2015). <http://goo.gl/xy4xjA>
- ◇ II Ibero-American Congress on Integrated Management of Coastal Areas. May 2016, Florianopolis (Brazil) <http://goo.gl/YgvAfJ>
- ◇ VIII Conference on Aquaculture on the South Atlantic coasts. Cartaya, 7th and 8th of June 2016 <http://goo.gl/hjsVdS>
- ◇ Trajan, Roman Emperor (International Colloquium), May 2016, UHU <http://bit.ly/2bO78j9>



• • • • • • • • • • • • • • • •

INTERNATIONALIZATION ACTIVITIES

Internationalization is a permanent objective of CEI-MAR. The programmes that have been carried out and all of the Plan reSEARCH are aimed at facilitating the realization of this type of project and increasing the internationalization of the partnership. Therefore the programmes of the Campus promote, from the pre-doctoral stage, the international mobility of researchers during their training stage, with the aim of establishing bridges of collaboration with prestigious international centres that lay the foundations for relationships that, in the medium-term, develop into international research teams that can compete successfully in international research project calls.

Furthermore, the offer of post-doctoral contracts aimed at attracting research talent to the Campus has been especially careful in its selection of the best researchers that in turn, have proven track records in international research. Those selected have had projects in co-authorship with researchers from Denmark, Austria, Costa Rica, the United Kingdom, the United States, Chile, New Caledonia, Germany, France, Morocco, Australia, Belgium, Israel, Holland, the Russian Federation, Switzerland and Canada.

Another aspect that favours the internationalization of the Campus is the organization of events that have significant international projection. In these congresses the CEI-MAR name is made visible at an international level, as researchers from all over the world take part in them such as in the case of the *Association for the Sciences of Limnology and Oceanography (ASLO)* or the *el Ibero-American Congress on the Integrated Management of Coastal Areas*, on a Latin-American scale.

The most important result reflected by the internationalization of research can be seen on

the following map, where those regions of the world in which scientific projects have been jointly carried out are represented (in orange), guaranteeing the international nature of the Campus².



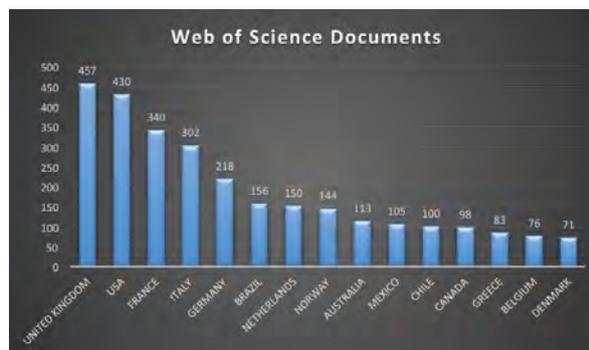
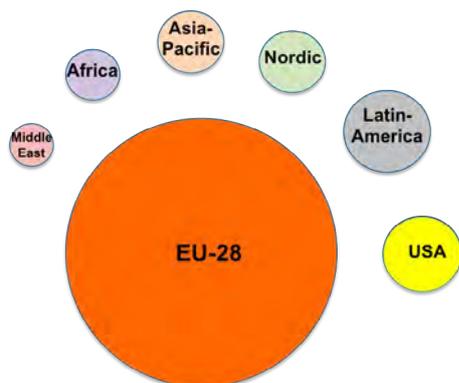
CEI-MAR has enhanced scientific work with university and research institutions from more than 100 countries (orange)

According to the intensity of the collaborations on a large-region scale, the graph shown below has been drawn up where it can be clearly seen that the main collaborations that are underway are between researchers from the partnership and partners from the European Union and long-distance, with Latin American countries and the United States being at practically the same level.

Finally, in the following diagram these relationships are shown by number of collaborations and the impact they have in the countries that CEI-MAR collaborates mostly with. It must be noted that two of these countries have institutions that participate in the consortium: Morocco and Portugal, and have been extracted from the analysis, even though between them, in the last five years they have collaborated over 1300 times with other CEI-MAR members. In the diagram it can be observed that Great Britain, France, Italy, Germany and Holland are the main collaborators in Europe while the United States, Brazil, Mexico and Canada are the main collaborators on the American continent.



³ Source inCities, carrying out a search on productivity in the period 2011-2016, of the institutions participating in the Campus, in those areas of research inherent to CEI-MAR.



These two diagrams show the number and intensity of CEI-MAR collaborations in different regions (left) and countries (right) of the world.

MOST IMPORTANT DEVIATIONS BETWEEN INITIAL OBJECTIVES AND RESULTS OBTAINED

Since the establishment of the Campus, the definition of an advanced research plan was made up of the development of pre-doctoral training programmes, the programme for attraction of talent and the organization of events such as the creation of a collection of monographs. The results obtained and the work carried out lead to the conclusion that the initial objectives set have been reached and surpassed. All of the offers launched have been extremely well-received and have had a high level of participation by members of the partnership. This situation has meant that the successful candidates are of a very high quality which results in an improvement to the research indicators of the partnership. The involvement of all the institutions in offers launched by the partnership in the Plan **reSEARCH** has been welcomed, some of them even providing their own funds to carry out some of the programmes, resulting in a greater funding capacity and therefore in results of a higher quality and excellence.



SECTION B.3. Enhancing the inter-relationship between Science, Technology and Business

Strategic area	Scientific and Knowledge Transfer Improvement
Programme	Enhancing the inter-relationship between Science, Technology and Business
Objectives	<p><i>Objective: Encourage, facilitate and support innovation and technological development throughout the field of marine-maritime economic activity, with a considerable focus on spreading this knowledge overseas.</i></p> <p>In a global economy, a company's competitiveness is directly related to how much it generates and applies knowledge to processes, products and services. Ultimately, its capacity for innovation is what makes it grow sustainably in an international market.</p> <p>A region or society's progress is strongly linked to how innovative its business sector is and to the strength and vigour that its higher education and research centres exercise. Likewise, the business world and research world need to be connected through innovation to increase competitiveness, generate wealth, create jobs and improve citizen well-being.</p> <p>The diversity of stakeholders and interests makes it necessary to coordinate actions under the common goal of enhancing the inter-relationship between Science, Technology and Business in the Marine - Maritime sector. This would enable innovative companies and entities to deepen and enhance their technological capacity and increase their results to benefit business competitiveness.</p> <p>This requires: bringing together research potentials, promoting the creation of interdisciplinary and inter-agency groups, integrating companies into the process of identifying research areas, leading to integrated action by those responsible for developing innovative capacity in the marine sector.</p> <p>For this purpose, stable links have been created that go beyond the classic concept of research transfer so that researchers' actions respond to a particular problem raised by a company.</p> <p>This programme incorporates six activities, which in turn correspond to several other secondary objectives:</p> <ul style="list-style-type: none"> ▶ Raise the profile of our research, which addresses business innovation needs, internationally. ▶ Form interdisciplinary and inter-agency groups for research and innovation. ▶ Promote a close and stable relationship between the business sector and scientific community. ▶ Give CEI·MAR institutional support to business innovation projects. ▶ Determine the R+D+i priorities to enhance the Science, Technology and Business network in the marine-maritime field. ▶ Design and disseminate the CEI·MAR catalogue of technological capabilities of interest to business innovation.





INITIAL OBJECTIVES FROM THE 2011 PROPOSAL

In the 2011 proposal, the same objective was considered: enhance the inter-relationship between Science, Technology and Business to promote innovation and technological development horizontally and extensively. It relies on the coordinated action of those responsible for developing marine-themed innovative capacity. It also discussed managing combined knowledge, encouraging synergies, disseminating activity developed and above all, connecting scientific and technological idea generation with their practical application in companies and society.

When considering the diversity of stakeholders and interests linked with marine knowledge (universities, research centres, Company R+D+i departments, technology parks, networks and associations, administrations, etc.) it was noted that there was a need to coordinate and connect their activity under an organizational network that has a common objective. This would allow companies and innovation entities to improve and increase their technological capacity and increase their results to benefit business competitiveness.

To this end, the **2011 CEI-MAR REPORT** considered the following areas of work in order to achieve this objective : 1) Create a catalogue of marine-themed Science-Business-Technology resources, 2) Foster **CEI-MAR's** participation in research networks, 3) Establish the International Network of Teaching and Research in Marine studies, 4) Set Science-Business-Technology priorities in R+D+i, 5) Define the Strategic Research Agenda, 6) Generate R+D+i projects.

As was explained in the 2014 Report, a reshuffling of these areas of work was deemed necessary and the second and third objectives, related to research networks, were moved to Section B.1. The **CEI-MAR** institutions' research and knowledge transfer clusters. At the same

time, we saw that the work we had already done would allow us to go much further than we had initially anticipated in 2011. For this reason, the areas of work were redefined into six lines of action (subsuming those initially envisaged as well as incorporating new fields) providing greater scope to the objective of generating scientific and technological knowledge linked to the needs of companies and society. They are determined by the following corresponding secondary objectives:

- ▶ Raise the profile of our research, which addresses business innovation needs, internationally.
- ▶ Form interdisciplinary and inter-agency groups, together with companies, for research and innovation.
- ▶ Promote a close and stable relationship between the business sector and scientific community.
- ▶ Give **CEI-MAR** institutional support to business innovation projects.
- ▶ Set Science-Technology-Business priorities in R+D+i for the marine-maritime sector.
- ▶ Design and disseminate the **CEI-MAR** catalogue of technological capabilities of interest to business innovation.



DESCRIPTION OF WORK ACCOMPLISHED

In just four years, **CEI-MAR** has achieved remarkable international importance and relevance and has furthermore become an essential tool in marine-maritime economic development in our geographic area of influence and well-being of society, stimulating and supporting business innovation and regional development.

As part of the cohesion policy of the European Union, in the period 2014 - 2020, the European Commission launched a series of rules and le-



CEI-MAR led the platform for the Blue Economy in Andalusia and organised the Blue Economy Workshop, A Sea of Opportunities

gislation governing the granting and implementation of European funds for regions and nations. It also obliges regions to determine genuine agendas with integrated regional economic transformation. The new approach for allocating European funds to nations and regions is known as National and Regional Research and Innovation Strategies for Smart Specialisation, more commonly known as RIS3.

In this European context, our participation was crucial in determining the *Regional Research and Innovation Strategy for Smart Specialisation for the Algarve* (RIS3 Algarve) and the proactive collaboration of CEI-MAR was even more decisive in the creation of the *Regional Research and Innovation Strategy for Smart Specialisation for Andalusia* (RIS3 Andalusia) (details in Section B4: "CEI-MAR Innovation Ecosystem: Platform for the Blue economy". In the Portuguese case, research and knowledge transfer capabilities in the marine-maritime sector were repeatedly mentioned throughout the official document <http://bit.ly/2cfynQl>). For example: The SWOT analysis expressly mentions as a strong point "university research in niche markets especially related to the marine sector" and as an opportunity "to consolidate University technology transfer activities".

Regarding Andalusia, 29 major innovative areas have been identified in various sectors of the *Andalusian Blue Economy*. This concept is in-

corporated into the priorities and the rest of the documents which make up the regional Smart Specialisation Strategy as well as subsequent documents which followed such as the ERDF Operative Programmes 2014-2020 or the PAIDI 2020.

The term 'Blue Economy' refers to all productive and sustainable activity related to the marine-maritime field. It is a very important concept within the European Union's growth strategy, where it is known as (*Blue Growth*). It is a long term strategy to support sustainable growth in the marine and maritime sectors. It recognises the importance of seas and oceans as driving forces in the European economy due to their major potential for innovation and growth. The Integrated Maritime Policy contributes to following through objectives set out in the 2020 Strategy for smart, sustainable and inclusive growth. The Blue Economy creates 5.4 million jobs in Europe and it is estimated that it will create almost 2 million more in the future. This currently relates to 500,000 million euros of gross added-value annually.

The European Commission predicts significant growth in sectors of the marine-maritime economy and has established a specific policy to boost and support it through various policies and responsible bodies from the European Administration.

For example, it can be seen in the Research and Innovation Programme **Horizon 2020**, especially in the Societal Challenges section. It is featured, although not exclusively, in the bioeconomy section, "*Food security, Sustainable Agriculture and Forestry, Marine, Maritime and Inland Water Research and the Bioeconomy*" (SC2), where the creations of *Public Private Partnerships for Blue Growth* are encouraged. Topics and needs related to Blue Economy can also be found in these challenges: "*Health, Demographic Change and Wellbeing*" (SC1); "*Secure, Clean and Efficient Energy*" (SC3); "*Smart, Green and Integrated Transport*" (SC4); "*Climate Action, Environment, Resource Efficiency and Raw Materials*" (SC5);



"Europe in a changing world: Inclusive, Innovative and Reflective Societies" (SC6); "Secure societies: Protecting freedom and security of Europe and its citizens" (SC7).

It also features uniquely in the European Commission Directorate-General for Maritime Affairs and Fisheries specific Blue Growth strategy.

This strategy is made up of three parts:

1. Specific Measures from the Integrated Maritime Policy (Marine knowledge to improve access to information about the sea; Maritime spatial planning to guarantee efficient and sustainable management of marine activities; Integrated maritime surveillance so authorities have a better understanding of what happens in the sea).
2. Maritime basin strategies that ensure the most appropriate set of measures to encourage sustainable growth that takes into consideration climate, oceanographic, economic, cultural and local societal factors for each of the basins. This is especially true for the Atlantic Ocean and Mediterranean Sea basins.
3. Specific activities in the following sectors: Aquaculture, Coastal tourism, Marine biotechnology, Ocean energy and Seabed mining.

All information on this Blue Growth strategy; notifications from the European Council to member states supporting this strategy; and current initiatives can be consulted on this page: <http://goo.gl/ksxGZX>.

For planning and programming purposes, the first step involved identifying different work groups within the CEI-MAR partnership, followed by connecting the partnership's technological capabilities with the innovation needs of companies. This allowed us to establish new and powerful synergies that contributed to enhancing the inter-relationship between Science, Technology and Business and allowed us to advance it further. With this approach, we have achieved important and significant accomplishments, such as: 1) being actively involved in European clus-

ters (public-private partnerships linked to Horizon 2020); 2) being one of the promoters of the creation of new European Partnerships such as *Vessels for the Future* or *Blue Growth*; 3) pioneering *Scientific-Business Clusters* with companies; 4) determining innovative opportunities for Blue Economy growth in the Algarve, Andalusia and Morocco; 5) succeeding in making the Blue Economy visible in all Research and Innovation Strategies for Smart Specialisation documents for the Algarve and Andalusia and in subsequent documents to be developed; 6) identifying specific business innovation projects and 7) creating inter-agency and interdisciplinary research groups (for large productive areas) to identify, in collaboration with companies and administrations, major lines of research that promote and support business innovation and provide solutions to societal challenges.

CEI-MAR's involvement has been decisive in setting up and subsequently developing important innovation projects which have had a strong magnet effect in the region and added to its development. Thus, to quote some examples that will subsequently be discussed in this section: 1) in the process of gradually introducing 'Shipbuilding 4.0' (the incorporation of information and communication technologies, automation, digitisation, additive manufacturing and the Internet of things to shipbuilding processes), we have developed automated welding and pursued additive manufacturing in boat building at NAVANTIA; 2) the design of smart tourism innovative projects, together with Telefónica, will lead to significant growth for local trade in cities with cruise ship tourism; 3) in the field of smart port management, together with the IAT (Andalusian Institute of Technology) and other foreign partners, we have established the smart port management model; and 4) in the field of aquaculture, we have developed pre-packaged food products recovering fish remains together with the company 'Esteros de Canela' and the Andalusian Aquaculture Technology Center (CTAQUA). And along with all these facts, we continue to drive innovation in all marine and maritime sectors



and use knowledge to open up new spaces of business opportunity and forward-looking economic activity, such as the development of new technologies for deep water marine current power; renewable energy that could be exported. An optimistic field for the future with a magnet effect for our geographic area.

And this has been made possible by the development of action programmes such as this *Enhancing the inter-relationship between Science, Technology and Business* and the programmes set out from it. This programme is a consequence and continuation of the first, *Research and knowledge transfer clusters of the CEI-MAR institutions in their areas of specialisation*, developed in section B.1.

Without abandoning knowledge transfer in the classic sense (apply generated knowledge to companies), with which we have achieved significant results as **evidenced by the 1502 knowledge transfer contracts with companies (see indicators) to the amount of 50,700,684 m€** between 2012 and 30 June 2016, CEI-MAR has also made significant, qualitative progress in developing the concept of knowledge transfer. It has worked on business innovation projects birthed and developed through mixed groups of researchers from different disciplines and the partner institutions as well as R+D+i staff from companies. Thus, this exceeds the classic concept of knowledge transfer, since new knowledge is generated as a response to problems that companies and society face and it is not only undertaken by researchers from universities and research centres, but by mixed teams composed of staff from these institutions and companies. It is believed that the closer the links are between CEI-MAR and the business world, the better business innovation will be and the better the group's contribution of knowledge will be for socio-economic development in our area.

We have strengthened the interchange between CEI-MAR partnership research and the productive sector, through programmes such

as: (1) Cataloguing our capabilities in key economic areas, (2) disseminating our capabilities through active participation in knowledge transfer forums and the annual Programme of Visiting Businesses, (3) *Workshops* conducted with Company R+D+i departments, (4) holding conferences on business innovation, (5) participating in technology forums linked to technology centres and clusters, (6) promoting joint research teams, (7) large interdisciplinary and inter-agency work groups for innovation, commented in section B.1., who have advanced institutional projects on business innovation and regional development. With regards to this last work area, we have been promoting the creation of projects set up institutionally by the group, in strategic economic areas in our geographic area, involving businesses, administrations and CEI-MAR. They contribute to regional development, changing the productive model based on innovation and generating qualified employment.

Likewise, R+D+i interests from innovative companies are systematically transferred to researchers; as are funded innovation areas.

All this work has resulted, among other things, in remarkable progress and an increase in the number of contracts with companies and the amount they bring in. Immediately prior to the Campus opening (2010/2011) there were 188 contracts which has grown to 323 in 2015/2016. This generated 5,847,317 € overall in the beginning and now generates 9,027,334 € (representing **an increase, respectively, of about 72 per cent in the number of contracts and of more than 54 per cent in terms of money**). It is important to note that this is in spite of the fact that the effects of the financial crisis began to be suffered during this time when private investment in R+D+i fell significantly from 2011 onwards¹. The most noteworthy aspects of the work accomplished over these four years are described in the following text divided into the 6 main work areas already mentioned.

¹ According to the National Statistics Institute (http://www.ine.es/inebmenu/mnu_imasd.htm), whilst in 2008, the total number of companies collaborating with universities in innovation projects was 2352; in 2014 there were only 1483, following a continued and constant downward tendency each year which equates to an accumulated decrease of more than 36%.



The vicepresident of the Andalusian Government and President of the CEI-MAR Foundation sign the agreement to locate the headquarters at the Andalusia Delegation in Brussels



Signing the agreement between the Argentine government and CEI-MAR for the Campus' participation in the Pampa Azul programme

1. Raise the international profile of our research applicable to business innovation needs.

CEI-MAR 's participation in networks takes into serious consideration the European R+D+i programme, **Horizon 2020 (H2020)**, especially the Societal Challenges and Industrial Leadership sections, as these are the European programmes that set the standard for projects that collaborate with businesses where research and knowledge sharing/innovation essentially go hand in hand. For this reason, and because of its great importance, the partnership pays special attention to **H2020** as well as other European programmes such as *Life +* and regional cooperation programmes (Interreg).

As was mentioned in section B.1., part of our internationalisation strategy has incorporated several major H2020 initiatives: The JTI **Bio-based Industries (BBI)** in 2014, and the PPPs **Sustainable Process Industry (SPIRE)**, **Factories of the Future (FoF)** and **Energy-efficient Buildings (EeB)**. Furthermore, we have been part of the PPP initiative **Vessels for the Future (VftF)** since its birth in 2015 and we collaborated in the initiative that created the PPP **Blue Growth (BG)**. Participation in these partnerships forms an essential part of the CEI-MAR partnership strategy, the distinct institutions that form the

partnership and the businesses that collaborate (represented by those involved in the CEI-MAR Foundation board), as a way of being awarded more **H2020** European projects and of raising our R+D+i profile internationally.

In addition, in 2014, the **Agreement with the Andalusian Regional Government**, was signed thanks to the initiative of the CEI-MAR chairman. Furthermore, thanks to his efforts, the partnership now has a **Delegation in Brussels** (<http://goo.gl/UtXpQw>) which can be used as a way of positioning itself to procure European projects, and in which there is a dedicated member of staff.

Furthermore, three specialists in European projects joined (two from the University of Cadiz and one from the University of Huelva) and one specialist joined the CEI-MAR delegation in Brussels. They meet with researchers and companies and coordinate proposals to present to various tender proceedings. Additionally, they channel information and advise researchers. In 2016, two more specialists were incorporated into the CEI-MAR Foundation.

As has been mentioned in section B.2., from 2012 to June 2016, the partnership boasted a total of 63 international projects, 28 of which are European projects in consortium with the business world. In addition to these, there are also other projects with companies in other programmes and others that have been presented and are waiting to be evaluated.



CEI-MAR signs the agreement to encourage industrial doctoral theses with CEPSA, the first large company to become a CEI-MAR Foundation trustee



Endesa, Telefónica and Santander bank join the CEI-MAR Foundation

Our participation is also very active in H2020 specific events such as *Info Days* and *Brokerage Events*, which specialists and researchers attend. This involvement in European Programmes extends to other programmes such as SUDOE, POCTEP etc. We would like to highlight our involvement in the *Atlantic Action Plan*, under whose umbrella we organised the second national stakeholders event ("II Workshop Somos Atlánticos") and in which we now have the responsibility of running the *2B Workshop "Strengthening Atlantic competitiveness: the opportunity of a Maritime Entrepreneurship Ecosystem Project"* within the *3rd Atlantic Stakeholder Platform Conference*, to be celebrated on 27 September in Dublin.

Our international influence is not limited to Europe although for obvious reasons it is given priority in our internationalisation strategy. In the same way, partnerships with Latin American countries have been established, of which we can highlight the agreement signed in May 2014 with the Minister of Science, Technology and Productive Innovation for the Government of the Republic of Argentina.

2. Form interdisciplinary and inter-agency groups for research and innovation.

As mentioned in section B.1., this important programme, aimed at advancing scientific work as a

partnership, has made it possible to set up interdisciplinary teams from the different institutions involved to tackle problems, societal challenges and challenges in the business world, with the end goal of developing technology at the forefront of responding to societal problems and those of businesses internationally. Whilst contributing to this, they are investing in social, economic and regional development in our geographic area. Each group has direct links with companies and technology centres or other important institutions from the same sector, creating a collaborative dynamic where research and innovation areas and topics are determined. The following interdisciplinary groups have already been formed: Living Marine Resources; Port Management and Transport Logistics; Shipbuilding/Offshore Industry; Renewable Marine Energies; Health and the Sea; Blue Tourism.

The groups can be described as follows:

Living Marine Resources:

This group is made up of researchers who belong to partner institutions from different research groups and from very different disciplines (Biology, Genetics and Marine Biotechnology, Ecology, Physiology and Pathology in Aquaculture, Food Engineering and Technology, Microbiology, Geochemistry, Environmental Engineering, Coastal Management and Regional Planning, Occupational Risk Prevention, IT, Law, Analytical



The CEI-MAR conferences of excellence are a meeting place for companies, universities and research centres to enhance business innovation



CEI-MAR has participated in the last four editions of the "Transfiere" Forum, held at the Convention Centre in Malaga

Chemistry, Physical Chemistry, Mathematics, Economics, Marketing, Neuropsychopharmacology, Oceanography, Geology and Geophysics, Environmental Toxicology, Geography, Geodesy and Geophysics, Civil Engineering, Marine Engineering, Electronics, Sociology etc.) The business nexus that can be held as a reference, without undermining the other national and international business connections, is the European *Bio-based Industries* cluster; the business entities involved in building the European *Blue Growth* cluster; the companies involved in the CTAQUA Foundation (Andalusian Aquaculture Technology Centre); and with the technology centre itself through the working groups.

This is led by Dr. José Pedro Cañavate Hors from the Andalusian Institute of Agricultural and Fisheries Research and Training (IFAPA). Its fields of work are:

- ▶ Marine ecosystem services. Its areas of work are: Natural, social and financial enhancement of salt marshes and saltworks; Coastal environmental monitoring systems; Connectivity to the marine environment and contribution to fishery resources; Aquaculture as a conservation tool for intertidal wetlands. (connection with aquaculture project); Regional Planning.
- ▶ Seaweed uses. Its areas of work are: Seaweed as a natural product source; Use of seaweed in environmental conservation.

From these, other topics can be broached such as: Bioproducts; Cooking, nutraceutical and cosmetic uses for seaweed; Nutrient removal from the environment; Maximise the value of biomass from the accumulation of nutrients.

- ▶ Aquatic resources. Its areas of work are: Production technology; Interrelation with its environment; Aquatic product management. From these, other topics can be broached such as: Improvement and genetic selection of established species; Biological processes related to the increase in product yields; Cultivated species prevention and physiological well-being; Maximising aquatic product quality; Identifying and developing new aquatic products; Incorporating aquaculture into the ecosystem; Multi-trophic aquaculture; Integrated management of the nutrient cycle; Aquaculture product development; Increase added value; Econometric models for aquatic production; Marketing and search for specific markets.

Port Management and Transport Logistics:

This group is made up of researchers who belong to partner institutions from different research groups and from very different disciplines (Transport and Logistics, Civil Engineering, Oceanogra-



With almost 200 attendees, the II “Somos Atlánticos Workshop”, organised by CEI-MAR, has been the most attended event done by the support team of the Atlantic Action Plan

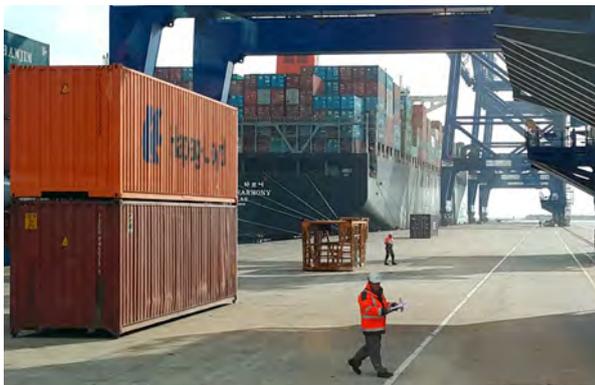
phy, Electronics, Computer Engineering, Maritime Law, Commercial Law, Administrative Law, Economics, Monitoring Systems, Maritime Policy, Telecommunications Engineering, Statistics, Mathematics, Ecology, Environmental Engineering, Engineering and Materials Science etc.). The business nexus that can be held as a reference, without undermining the other national and international business connections, is with the port authorities from the Andalusian ports. For example, the Port Authorities of Algeciras (APBA), Cádiz (APBC), Motril (APM) and Huelva (APH).

This is led by Dr. Miguel Angel Losada Rodríguez from the University of Granada. Its fields of work are:

- ▶ Port Management:
 - ◊ Strategic management (Port infrastructures and superstructures, Economic assessment of port infrastructure, Maximising port processes, Competition and port competitiveness, Efficiency and port efficiency, Productivity Indicators, Safety and port protection, Environmental impact in the port environment, Sustainability and the environment -Energy efficiency in the port environment-, Working towards Smartports -Terminal automation-, Labour Law: special rules for port workers, Relationship between the port and

city, Port governance, Road and rail connections, Short Sea Shipping and Motorways of the Sea, Port taxes and charges, Public domain management, Passenger transport: regular crossings and cruises, Fishing industry, Human resources management in the port vicinity. Competency-based management, Taxation of international transactions).

- ◊ Engineering and port planning (Physical modelling in ports -Reliability and risk in port design-, Interaction between port and coast -Wave theory and coastal dynamics-, Port infrastructure planning and design, Refills, docks and mooring. Port paving, dredging in port areas and signalling, Dimensioning port terminals, Monitoring intervention, Technical and financial planning for works to be carried out).
- ▶ Transport Logistics (Logistics platform, Logistical activity planning -simulation to assess logistical and intermodal systems-, Modelling methods in logistical systems, Prediction methods as required for port traffic, Supply chain optimisation, Supply chain globalisation, Multimodal transport).
- ▶ Maritime Transport (Maritime safety and boating accidents, Maritime transport economic impact, Environmental impact related



CEI-MAR participates in clusters such as the shipbuilding and offshore cluster, together with large and medium sized companies. In the image on the right, Campus researchers work on the robotised welding project with Navantia

to maritime transport, Vessel classification, Energy efficiency of vessels, Marine pollution, Commercial law for maritime transport for commercial use and passengers).

Shipbuilding and Offshore Industry:

This group is made up of researchers who belong to partner institutions from different research groups and from very different disciplines (Marine Engineering, Mechanical Engineering, Computer Engineering, Automation, Telecommunications Engineering, Engineering and Material Sciences, Environmental Engineering, Engines, Electronics, Economics, Mathematics, etc.). The business nexus that can be held as a reference, without undermining the other national and international business connections, is with: NAVANTIA; the European clusters *Vessels for the Future* and *Factories of the Future*; and the Cádiz Naval Maritime Cluster.

This is led by Dr. Mariano Marcos Bárcena from the University of Cadiz. Its fields of work are centred around industrial solutions for products and processes within advanced manufacturing:

- ▶ Designing and Optimising Manufacturing Processes (developing the "virtual shipyard" concept, constructive process flows modelled and simulated under different scenarios, for the study, on a virtual model, with different constructive strategies, designs focused on manufacturing and organisational charts).

- ▶ Design and Development of Teams and Technologies (developing new productive processes, for example, additive manufacturing and others which enable a greater level of automation and robotisation in tasks such as preparation, cutting, joining, assembling, surface treatment for metal materials, complying with specific shipbuilding requirements).
- ▶ Design and Development of New Products and Improved Products.
- ▶ Optimising Manufacturing Systems.

Renewable Marine Energies:

This group is made up of researchers who belong to partner institutions from different research groups and from very different disciplines (Engineering and Material Sciences, Marine Engineering, Environmental Engineering, Ecology, Physical Oceanography, Geology, Computer Engineering, Electronics, Trade Law, Administrative Law, Maritime Law, Electrical Engineering, Telecommunications Engineering, Economics, Sociology, Chemistry etc.) The business nexus that can be held as a reference, without undermining the other national and international business connections, is with: companies involved in the creation of the European cluster *Blue Growth*, ENDESA, ENEL GREEN POWER and the Andalusian Technology Centre for Renewable Energies (CTAER).



Renewable energies and living marine resources are part of two clusters enhanced by CEI-MAR together with companies from these sectors

It is led by Dr. Miguel Bruno Mejías from the University of Cadiz. Its fields of work are:

Hybrid technologies, Technologies for deep water currents, Feasibility studies and permits, Environmental impact, Study of environment, Creation of prototype testing and validation area, Remote monitoring technologies, Cost reduction, Power storage and transmission, Materials.

Health and the Sea:

This group is made up of researchers who belong to partner institutions from different research groups and from very different disciplines (Neuropsychopharmacology, Chemical Engineering, Marine Biotechnology, Ecology, Oceanography, Psychobiology, Neurobiology, Organic Chemistry, Environmental Engineering, Genomics, Endocrinology, Immunology, Microbiology, Nutrition, Sports Medicine, Tourism, etc.) The business nexus that can be held as a reference, without undermining the other national and international business connections, is with: PharmaMar, Phitoplancton, CTAQUA and the European *Bio-based Industries* cluster, and some business entities involved in forming the European *Blue Growth* cluster.

It is led by Dr. Juan Antonio Micó Segura from the University of Cadiz. Its fields of work are:

- ▶ Research and exploitation of marine resources. Pharmaceutical and Nutraceuti-

cal marine products: use of products and by-products. The aim is to place a value on using marine-related products and by-products in new therapies. The areas of work are: Microbiology, Oncology, Neurosciences, Pulmonology, Cardiology and Blood, Endocrinology and Nutrition, Inflammation, Immunology.

- ▶ The Sea as a Source of Health. The aim is to promote marine-related health and well-being measures. The areas of work are: Health treatments regarding the range of Respiratory Pathology, Physiotherapy, Rheumatology: Thalassotherapy, Nutrition and Dietetics, Pediatrics: Child health and the benefits of living near the sea, Regenerative dermatology with marine resources, Marine sports and sports health with reference to the sea, The sea as a source of mental health, Cardiovascular and marine rehabilitation: Hyperbaric Medicine - Underwater Activities, Healthy aging with reference to the sea, Residential health with reference to maritime activities: Health tourism, Fishery related diseases: detection, assessment and advice, Medical pathology of living aboard a vessel: detection, assessment and advice.

Blue Tourism:

This group is made up of researchers who belong to partner institutions from different research



groups and from very different disciplines (Tourism, Sociology, Geography, History, Marketing, Economics, Computer Engineering, Human Resources, Archaeology, Geochemistry, Nanomaterials, Mathematics, Coastal Management, Zoology, Trade Law, Administrative Law, Heritage, Gastronomy, etc.) The business nexus that can be held as a reference, without undermining the other national and international business connections, is with: the State Society for Innovation and Tourism Technologies Management (SEGITTUR), the Technological Centre of Tourism, Leisure and Quality of Life (TECNOTUR) and El Corte Inglés travel agency.

It is led by Dr. Antonio Guevara Plaza from the University of Malaga. The fields of work are those related to the development of blue, smart, sustainable and competitive tourism:

It works on creating a Tourist Knowledge Management System based on an open technological design which makes it possible for heterogeneous systems to interact in order to store bulk data. The idea is based on Big Data and Open Data. It will gather tourist information and make it possible to develop blue, smart, sustainable and competitive tourism. The fields of work are:

- ▶ **Designing the Blue Tourism Model concept**, and defining this tourist market's systems, analysing the sub-sectors involved:
 - ◇ **Cruise ship tourism:** This activity takes place on board a boat or ship, offering its passengers the same services and facilities found in a large hotel or world resort.
 - ◇ **Maritime tourism:** covers water activities such as sailing and water sports.
 - ◇ **Coastal tourism:** beach tourism and recreational activities such as swimming, sunbathing or tourism for those who benefit from being close to the sea. We can also mention walking along the coast or enjoying wildlife.

▶ **Description of Leisure Types** within Blue Tourism:

- ◇ Identifying and describing the different leisure types.
- ◇ Structuring leisure types by markets.
- ◇ Future trends.
- ◇ Market opportunities.
- ◇ Economic impact.

▶ **Designing sustainable tourism products related to blue tourism:**

- ◇ Marina ecosystem. Basic services and complementary activities
- ◇ Health Tourism in a coastal environment: Synergies and development of strategic alliances.
- ◇ Cultural Heritage and the Sea: Underwater Archaeology and marine museums.
- ◇ Marine fauna: Cetacean sighting, underwater coral photography, sport fishing, lifting traps, etc.
- ◇ Gastronomy of the sea: spaces and sensations.

▶ **Blue Tourism Planning and Management:**

- ◇ Assessing and rating the sustainability of tourist destinations based on the European indicators of sustainability.
- ◇ Designing an interactive system to assess the sector's competitiveness through a system of indicators and a scorecard to guide tourism policy and company decision making.
- ◇ Integrated Management of Coastal Zones, as a model of comprehensive management in tourist destinations.
- ◇ Designing a protocol of action (evacuation plans) to prepare for disasters.
- ◇ Analysing tourism risk management, focusing on analysing tourist traceabi-



lity in the destination, load capacity and adaptation to climate change.

- ◇ Study of available financial instruments and EU financing based on the "Blue Growth Strategy" and the "Integrated Maritime Policy" related to tourism; as well as these related programmes: European Destinations of Excellence (EDEN) and Social Tourism (CALIPSO).

These groups are coordinated from the Presidency for the Inter-institutional Committee for Research and Knowledge Transfer, where they work on cross-disciplinary themes and build connections between the areas of work from one group to another. In addition, it is important to emphasize the importance of direct contact with various companies with whom they still have work meetings.

Along the same lines of coordination and regarding these businesses, a "CEI-MAR R+D+i Seminar" was organised. (<http://goo.gl/bh9Uke>). It enabled five of the groups to meet together (with the exception of Shipbuilding and Offshore due to scheduling issues) with the participation of companies in each of the five areas. In the general assembly, coordinated by the Inter-institutional Committee for Knowledge Transfer, a brainstorming session was carried out in which the existing connections between them were analysed.

The Seminar examined, in depth and from a variety of perspectives, elements that can influence innovation in different areas of marine research. This seminar brought together a large part of the leading CEI-MAR research groups, from all the universities and PRIs as well as companies or public administrations interested in the main 5 thematic areas (Living Marine Resources, Port Management and Transport Logistics, Renewable Marine Energies, Health and the sea and Blue Tourism).

A full day was devoted to each area, and was attended by CEI-MAR staff, companies and guest speakers from the academic world, the busi-

ness sector or public administration. They explained their experience and vision for the thematic area acting as promoters. All sessions were tackled from an interdisciplinary approach with the participation of experts from various fields including Natural Sciences, Engineering, Law, Economics or Humanities. Press release: <http://goo.gl/daR8Hq>.

Also with the purpose of maintaining ongoing coordination, specific meetings were set up between the leaders of the six clusters, the President of the CEI-MAR Foundation and the chairpersons of the Inter-institutional Committee for Research and Knowledge Transfer. The Shipbuilding and Offshore cluster also participates as a coordinator in the Naval Maritime Clusters' Committee for Innovation as previously mentioned.

There is also a database of CEI-MAR research groups and researchers, in which each member of CEI-MAR is listed under the institution they belong to, their research group, research field, R+D+i cluster, responsibility or post and any working committees they are a part of. The database is continually updated.

3. Promote a close and stable relationship between the business sector and the CEI-MAR scientific community.

Over these four and a half years, much work has been done to create contacts with companies in the marine-maritime sector, as well as with associations and business groups, as a prior step to setting up business research groups for R+D+i. There is also close contact between technology centres, technology parks and Andalusian foundations directly involved in CEI-MAR areas.

Our commitment to society is seen in the implementation of various secondary action points which together contribute to the goal of connecting research closely with the needs of the socio-economic environment. In this way, the



following strategic secondary action points have been put in place, aimed at advancing with regard to the objectives.

3.1. Incorporating business entities into the Board of Trustees for the CEI-MAR Foundation and other strategic agreements with companies.

As governing body for the alliance, **CEI-MAR Foundation** is the formal setting where the main areas are outlined. The **CEI-MAR** strategic lines are taken from these, formulated and detailed. This is a campus founded from the start on the support of a significantly large number of companies, with the aim of being an instrument for economic and social development and job creation. It is permanently linked to these needs and attentive to the challenges that society poses. Therefore, although the **CEI-MAR Foundation** is a public foundation, we have incorporated a significant group of business entities into our board of trustees.

This establishes strategic ties with significant business entities, through their membership to the Board of Trustees, which guarantees funding to run innovation areas previously mentioned, in the various fields of the Blue Economy (Shipyard 4.0, Renewable Marine Energies, Blue Tourism, etc.). In turn, it constitutes an ongoing forum to analyse training, research and innovation needs that our society requires for continued upward social progress.

3.2. Doctoral Theses in Companies. Programme

As mentioned in section B.2., in 2014 we were pioneers in implementing the **CEI-MAR** programme of industrial doctoral theses. The intention is to promote the incorporation of talent into the productive sector to raise their competitiveness and promote and encourage socio-economic development through innovation, whilst creating close collaboration links in research and innovation between companies and **CEI-MAR**.

To implement this programme, all necessary legal documentation was prepared (templates for agreements and public calls for bids, template for industrial property agreement, management protocols, selection processes, etc.), as well as making necessary contacts with companies. Seven pre-doctorate contracts are in place through two bidding processes (Links: <http://goo.gl/xTu5Mn>, <http://goo.gl/tzTvYM>). The companies are: CEP-SA, Abengoa, Bioorganic Research and Services S.A. (Bionaturis), FCC Aqualia, S.L. y Dreams Factory Advertising&Desing S.L. (Aerocámaras).

3.3. Setting up and participating in innovation clusters (scientific-business).

One of the most significant activities within the strategic focus area of Improving Science and Knowledge Transfer is the participation in clusters and our initiative to create new ones in areas of economic interest. It has enabled us to consolidate relationships of trust between companies and **CEI-MAR** at the same time as providing a suitable framework for encouraging innovation, determining projects and building mixed groups of companies and **CEI-MAR**. Details of these clusters are set out in section B.1.

3.4. Knowledge transfer days, workshops with companies and other activities with stakeholders regarding the Blue Economy.

In order to be able to enhance the inter-relationships between the business sector, the marine-maritime sector and the **CEI-MAR** R+D+i groups, it is essential to remain on the ground as much as possible. This is achieved through various activities, such as through participating in the clusters, as well as other ways of meeting with staff from Company R+D+i departments and other technology experts. They also include knowledge transfer days and even business visits. The **CEI-MAR** Inter-institutional Committee for Knowledge Transfer, the **CEI-MAR Foundation** and various institutions from the consortium are involved in these activities



CEIMAR Research and innovation groups meet in Antequera

through their respective knowledge transfer departments.

Particularly noteworthy is the annual programme of business visits and meetings that the Presidency of the Inter-institutional Committee for Knowledge Transfer has followed for the mentioned purposes. From January 2012 to June 2016, companies, business associations and technology centres have met together a significant number of times. Many of these contacts have led to collaborative projects between CEI-MAR researchers and these companies.

The activities, which focused on technology in their different formats between companies and researchers, are an appropriate instrument for connecting research with the sector's innovation needs. In this way CEI-MAR is committed to encouraging these types of activities in various formats. Here is a list of the different types of meetings: Conference series on business innovation, Knowledge Transfer Days, *Workshops* with companies and Knowledge Transfer Fairs. Aside from and in addition to the activities that we have outlined in the Results Section, we would like to highlight the following cases:

► **The business innovation conference series**

This way of forming close relationships between researchers and companies creates a space for information sharing and dialogue. This means that the needs of the latter and potential of the former become mutually acknowledged. Thus, in



The CEI-MAR Board of Trustees has prioritised enhancing the innovation clusters which are already running

June 2014 the first *Business Innovation Conferences* programme was set up, delivered by R+D+i department directors from companies and relayed live by interactive video-conference to all in the CEI-MAR partnership. We are currently designing the third edition.

These conferences contribute to the aim of closely connecting researchers and companies as they are another way of bringing people together, enabling researchers to know the companies' R+D+i interests as well as helping the companies know the potential that the research members of the partnership can offer. So far, 12 conferences have been held with the participation of: D. Manuel Doblaré, director of Abengoa Research; D. Rafael Domingo Larraz Mora, director of the CEPSA Research Centre and CEPSA representative in the European partnership *Bio-based Industries*; D. Ignacio de La Rosa Lucas, Technical Director, Culma-sur (Cultivos Marinos del Sur - Langostinos de Huelva); D. Pedro Mayorga, Technical Director, ENEROCEAN ; D. Francisco López, Magtel Technical Manager R+D, Magtel; D. José Ignacio de la Fuente, Director of R+D+I, Ubago Group Mare; D. Javier Brañas Lasala, Director of R+D+I, Fertiberia; D. Julio Docando Valencia, Product and Coordinating Manager, Dietas Salud en el Mediterráneo; D. Víctor Manuel Infante Viñolo, Managing Director, Bionaturis Group; Dña. Inmaculada Valencia Bayón, General Director of Economy and European Affairs, Go-



CEI-MAR has organised three business innovation conference series with the participation of R+D+i managers, from prominent companies in the marine-maritime sector. In the image on the left, Rafael Domingo Larraz (CEPSA). On the right, José Ignacio de la Fuente (Ubago)

vernment of Cantabria and Managing Authority for the SUDOE Programme, Dña. Rosa Rico Blanco, Director of R+D+i, Bedson Europe; D. Santiago Blanco, Director of Innovation, AYESA. These conferences are organised by the Presidency of the Inter-institutional Committee for Knowledge Transfer with the help of the committee members, technical staff from the Research Knowledge Transfer Offices (OTRI) from five Andalusian universities and staff from the CEI-MAR Technical Office. The business entities collaborate in the organisation and disseminate the information.

► **Participation in the “Transfiere” forums.**

CEI-MAR has participated with its own stand in all the Transfiere forums between the second edition in 2013 and the fifth this year, 2016. The Transfiere Forum, which is held every year in February in Malaga, provides researchers and companies with the opportunity to establish connections. In each of these editions CEI-MAR has connected with dozens of companies. In many cases, these contacts have led to subsequent knowledge transfer contracts between different research groups from the partnership.

► **Workshops in action.**

Workshops have been run with the following companies and institutions: SAES, NAVANTIA, ELIMCO, ACERINOX, TECNALIA, Technological Corporation of Andalusia, companies that form

part of the Naval Maritime Cluster, companies from the Association of Renewable Marine Energy Producers (APPA Marina).

► **Study Days**

Prominent among these:

- ◊ Organisation of *The Blue Economy: a Sea of Opportunities* Study Day, which gathered major innovative companies from the marine - maritime sector and focused on the innovative opportunities in the following sectors: *Marine Resources, Port Logistics, Transport and Tourism and the Shipbuilding Industry, and Renewable Offshore Energies.* (<http://goo.gl/LIKF5E>).
- ◊ Organised together with the Support Team for the DG MARE Atlantic Action Plan, the *II Workshop Somos Atlánticos*, with the aid of the Andalusian Regional Government's Department of Economy and Knowledge, the Innovation and Development Agency of Andalusia (IDEA) and the Business Confederation. The opening session was given by the vice-president of the Andalusian regional government, the Advisor for the Department of Economy and Knowledge, the Mayor, the President of the CEI-MAR Foundation and the Representative of the Ministry of Foreign Affairs. It was attended by 189 national participants



CEIMAR Stand at the "Transfiere" Forum 2016



CEI-MAR has organised specialized workshops, such as the one with the marine section of the Association of Renewable Marine Energy Producers (APPA)

who had an interest in implementing the Atlantic Action Plan as a means of developing the Spanish Atlantic region. The level of participation at the event was a success, attracting more participants than any of the 10 national events that the Assistance Mechanism has organised in European Atlantic countries (<http://goo.gl/tUKXza>).

- ◇ Responsible for organising and running *Workshop 2B "Strengthening Atlantic competitiveness: the opportunity of a Maritime Entrepreneurship Ecosystem Project"* as part of the *3rd Atlantic Stakeholder Platform Conference*, to be held on 27 September in Dublin (<http://goo.gl/0MwaU4>).

4. Give CEI-MAR institutional support to business innovation projects

Since its birth, CEI-MAR has aimed to be an organisation that boosts economic and social transformation in its geographic area of influence, as well as spreading its knowledge internationally, especially in Europe. One of the key ways CEI-MAR transfers scientific knowledge to society is through promoting and supporting innovation projects that are based on research in universities, research centres, institutions and companies. In order to do this, over the last four years,

we have planned, programmed and carried out actions to help us connect with the productive sector, as mentioned in the paragraph immediately above. Building on this, it has been able to run its **own programme of projects for business innovation and regional development**. This moves CEI-MAR significantly forward in becoming known as an important tool for prioritising, enhancing and supporting innovation in the Blue Economy, which subsequently advances social progress.

CEI-MAR is committed to helping society value the day-to-day role that innovative companies play in transforming the social reality and region that CEI-MAR serves. With this objective, business innovation has been directly enhanced through a specific Business and Regional Innovation Projects training programme through the CEI-MAR Foundation, with the following aims:

1. Support the efforts of innovative companies within the marine-maritime field which generate high added value to the region and are closely linked to the scope of CEI-MAR.
2. Promote innovation in companies who work in the Blue Economy or in those belonging to CEI-MAR.
3. Value knowledge transfer generated by universities and CEI-MAR research centres as well as their application in the Campus of Excellence target region.



4. Promote cooperation between CEI-MAR knowledge-generating centres and companies in order to reach excellence and innovation.
5. Prioritise interdisciplinary work and promote focuses that incorporate the inter-relationship between Science, Business and Society.

In the first meeting, 18 projects were presented from companies with varying geographic locations and from different sectors of the Blue Economy (Links: <http://goo.gl/Gf2kPC>, <http://goo.gl/5L5TBJ>).

As seen, the institutional boost that CEI-MAR brings to business innovation has been approached from different perspectives and through different initiatives. There have been numerous meetings with companies, business entities and administrations, not forgetting the novel initiative of the call for business innovation and regional development projects. All of them have contributed to increase the partnership's number of projects. It is true to say that these are projects which would not have been obtained otherwise and some them have a scope and influence far greater than a normal knowledge transfer project, establishing new lines of institutional collaboration between companies and CEI-MAR. All of this will be detailed in the Results Section.

5. Setting Science-Technology-Business priorities in R+D+i that are related to the marine-maritime sector.

Setting Science-Technology-Business priorities in R+D+i has been a key issue in which we been working since the very beginning, through different approaches.

There was an initial need to determine all of the partnership's capabilities as well as the current R+D+i research areas that carried the greatest potential. This approach was possible thanks to the work of an *ad hoc* Inter-institutional Committee for Programmes and Strategic Research Areas, created in 2012. The work of this Committee initially identified 12 fields of research according to areas of specialisation, which were subsequently reorganized into six strategic areas:

- ▶ Marine ecosystems and social benefits in a scenario of global change.
- ▶ Multi-trophic marine crops and new technologies in aquaculture.
- ▶ Renewable marine energies.
- ▶ Smart, sustainable and integrated maritime transport.
- ▶ Tourism and marine cultural heritage.
- ▶ Shipbuilding industry and offshore.



CEIMAR has actively participated in this third meeting of the Atlantic Action Plan



CEI-MAR has offered its technological innovation and patents to companies in the sector



The work of this committee was used as a necessary information source to analyse the R+D+i needs of companies and connect them with CEI-MAR's research strengths. As an additional consequence of this work, a **Catalogue of CEI-MAR's technological capabilities for R+D+i** was compiled. More details are given in a later subsection (subsection 6 of this section).

At the same time, work was carried out with companies to determine R+D+i needs and priorities for the 2014 - 2020 period. This focused mostly, although not exclusively, on the partnership's work linked to that determined by the RIS3 (for Andalusia and the Algarve). The work on Andalusia focused on the **Platform for the Blue Economy** (composed of 22 entities from all over Andalusia, including large, medium and small companies, business associations, technology centres, port authorities and CEI-MAR) which led to the book **The Blue Economy in Andalusia** containing innovation opportunities and priorities. The work on Portugal was performed directly within the committees responsible for designing the RIS3. This topic will be discussed further in section B.4. The participation of companies in the board of trustees for the **CEI-MAR Foundation** has naturally influenced which R+D+i priorities have been set for the partnership. And without a doubt the multiple contacts with companies, in diverse formats, have also contributed to refining the priorities.

In both situations, six interdisciplinary and inter-agency partnerships for research and innovation were formed, together with companies, as explained previously in subsection 2 of this section 'Description of Work Accomplished': Living Marine Resources; Port Management and Transport Logistics; Shipbuilding Industry and Offshore; Renewable Marine Energies; Health and the Sea; Blue Tourism. Partnerships which are working on priority R+D+i areas already identified in the aforementioned sub section and that constitute CEI-MAR's Science-Technology-Business priorities in R+D+i for the Marine-Maritime sector.

In addition, we have created a **Catalogue of Scientific and Technological Resources and Facilities** with great potential to develop technological innovation projects. (This can be downloaded at: <http://bit.ly/2c7m89n> and <http://bit.ly/2c4eQTD>).

6. Catalogue of CEI-MAR's technological capabilities of interest to business innovation and dissemination of capabilities.

As has been previously discussed, work with the companies has been mainly carried out through the technological platform referred to as the **Platform for the Blue Economy**. As a result of this work, a core group of R+D+i priorities was identified to boost the inter-relationship between Science, Technology and Business in the Marine-Maritime sector. These have been described in around 30 innovation opportunity sections in the document **The Blue Economy in Andalusia**, following the identification process described in section B.4. This work, in conjunction with the determining of potential researchers from the partnership, enabled the preparation of the **Catalogue of CEI-MAR's technological capabilities of interest for business innovation and the dissemination of capabilities**.

This catalogue has made a list of CEI-MAR's knowledge transfer capabilities available to the business sector, always intended to promoting entrepreneurial innovation, economic development for the campus' geographical areas of influence and job creation. Identifying these capabilities allows companies to know what universities and CEI-MAR scientific centres research and to what extent this knowledge can be useful for their innovation projects. However, it is also useful for the scientific centres as it lets them know what problems and technological needs the companies have and makes these needs visible to researchers.

The catalogue of R+D+i capabilities is available through a portal on the Internet (<http://goo.gl/>



CEI-MAR has made its catalogue of capabilities available to the productive sector

dr11ZP) thus facilitating any company to be informed of the technological capabilities that CEI-MAR can offer to entrepreneurial innovation. A catalogue of scientific and technological facilities has also been created, which we have referred to previously and which will be discussed in section B.7.



ROLES OF THE PARTICIPANTS

The various members of the partnership have been actively involved in developing the areas of work in the programme: **Enhancing the inter-relationship between Science, Technology and Business**. The planning and management bodies for the actions and developments related to this Programme are the Inter-institutional Committee for Research and the Inter-institutional Committee for Knowledge Transfer. When necessary, both committees have met together to determine which actions were required. Both committees are made up of representatives from each of the institutions. The activities agreed are run by different entities through their representatives in these committees, the CEI-MAR coordinators in each entity and the manager of the CEI-MAR Foundation.

This procedure ensures that all partnership members actively participate in all joint activities. Thus:

- ▶ With regards to the European projects, the Office in Brussels has provided advice and support to all partners, as has the **Foundation** from which several projects have been presented (already indicated in the Description).
- ▶ With regards to participation in the international clusters (public-private partnerships linked to Horizon 2020), **CEI-MAR** researchers participate in the various *Info Days* and other events and work groups with the support of dedicated members of staff for the European project and particularly with the direct support of our office in Brussels.
- ▶ Due to the location of the headquarters for the national clusters, the programme in this case has come from the presidency of the Committee for Knowledge Transfer.
- ▶ In establishing the interdisciplinary and inter-agency groups, all entities have participated, as is reflected in the corresponding subsection of this section.
- ▶ All Andalusian companies linked to the marine-maritime sector have been invited to be involved with the doctoral theses in companies programme. Following this, the students invited to participate are those enrolled on **EIDEMAR** doctorate programmes, requiring the participation of all members.
- ▶ The entrepreneurial innovation conferences have been relayed by internet to every member of the partnership (both by streaming and interactive broadcasting in each of the Andalusian universities that form part of the partnership) regardless of where the conference was held.
- ▶ In the Knowledge Transfer Study Days such as Transfiere, all members have attended and the **CEI-MAR Foundation** has managed the stand.



- ▶ All members of the partnership along with hundreds of its researchers and dozens of companies were involved in the process of determining the R+D+i priorities.
- ▶ All members have been involved in designing the catalogue of capabilities, describing their activity through the **CEI· MAR Foundation** and the knowledge transfer departments of the partnership's members.
- ▶ All institutions and the **Foundation** have participated in the meetings held with companies.
- ▶ The call for innovation projects went out to Andalusia and various companies from distinct provinces participated as well as research groups from different institutions in the partnership. In fact, the final decision benefited two companies in Cadiz, one in Huelva and one in Granada.

In addition, all partners have been actively involved in the design and implementation of contracts and collaborative projects with companies, European projects, registered software and patents, each to a greater or lesser extent depending on the size of the institution in the marine - maritime sector.

• • • • •

MOST SIGNIFICANT RESULTS

As we have pointed out previously, our actions to enhance the inter-relationship between Science, Technology and Business have gone much further than we had originally anticipated in the initial 2011 report. The creation of stable links and the relationships of trust that we have built with companies, the work in business clusters, the creation of interdisciplinary and inter-agency research groups working on priority areas of R+D+i towards socio-economic development and the decision to promote our innovative activity internationally have produced a significant change not only in the form and

concept of the knowledge transfer relationship but also in quantitative and qualitative results regarding research and innovation projects with companies.

Below are the most significant figures corresponding to the actions carried out and reported under the heading "Description of Work Accomplished", following the same numbering. Given the large quantity of results obtained from specific collaborative projects, we will only mention some of the 1,502 contracts and projects obtained with companies.

1. Raise our international profile for our research applicable to the needs of business innovation.

As has been mentioned, the number of European projects in conjunction with companies is 28. Some specific projects will be highlighted later in this same section, "Most significant results" when discussing innovation projects (sub heading 4 of the section).

In terms of other outcomes, we can highlight:

- ▶ Incorporation of three European project staff members.
- ▶ Delegation in Brussels, through an agreement with the Presidency for the Andalusian regional government. (<http://goo.gl/UtXpQw>).
- ▶ Participation in the European private public partnerships: *Biobased Industries (BBI)*, *Sustainable Process Industry (SPIRE)*, *Factories of the Future (FoF)* and *Energy-efficient buildings (BSE)*, *Vessels for the Future (VftF)* and in promoting the *Blue Growth (BG)* initiative.
- ▶ Agreement with the Ministry of Science, Technology and Technological Innovation for the Republic of Argentina.
- ▶ Organisation of events and *workshops* for the Atlantic Action Plan events.



2. Form interdisciplinary and inter-agency groups for research and innovation.

The following interdisciplinary and inter-agency groups have been formed and are fully operating. They are described under the "Description of Work Accomplished" heading: Living Marine Resources; Port Management and Transport Logistics; Shipbuilding Industry and Offshore; Renewable Marine Energies; Health and the Sea; Blue Tourism. An R+D+i seminar has been jointly coordinated and run.

3. Close and stable relationship with the productive sector

- ▶ Incorporation of CEPSA, TELEFÓNICA, ENDESA, SANTANDER BANK and ANDALUSIAN BUSINESS CONFEDERATION on the **CEI-MAR Foundation** board) (<http://goo.gl/we53UB>) (<http://goo.gl/odSZBK>).
- ▶ Implementation of 7 pre-doctorate industry contracts (<http://goo.gl/xTu5Mn> and <http://goo.gl/tzTvYM>).
- ▶ Creation of Naval Maritime Cluster, in the region where the R+D+i committee operates (<http://goo.gl/2Uxwhc>).
- ▶ Participation of **CEI-MAR** as a collaborative entity in the business association *Cádiz Sea Blue Economy*, created on 5 March 2015 (Link in the news bulletin: <http://goo.gl/sRjqit>).
- ▶ Impartation of entrepreneurial innovation conference:
 - ◇ "Research in the Industry. The case of Abengoa Research". Dr. Manuel Doblare Castellano, director of Abengoa Research, 6 June 2014 (<http://goo.gl/nij2wH>).
 - ◇ "Bioenergy, biopetrochemistry and the future of petroleum". Dr. Rafael Larraz, director of the CEPSA research Centre, 26 June 2014 (<http://goo.gl/hyQs6o>).
 - ◇ "Aquaculture in estuaries. R+D Needs". Dr. Ignacio de La Rosa Lucas, Technical Director of Culmasur, 10 July 2014 (<http://goo.gl/MM944Q>).
 - ◇ "Bionaturis Group: towards global access to health". Dr. Víctor Infante Viñolo, Managing Director, 25 November 2014. (<http://goo.gl/UruO3n>).
 - ◇ EnerOcean: renewable energy sources from the seas and oceans". D. Pedro Mayorga, Technical Director/CTO of EnerOcean S.L., 27 May 2015 (<http://goo.gl/08jmJt>).
 - ◇ "Magtel: technological design, construction, installation and industrial maintenance in the environment, telecommunication and energy". D. Francisco López Banderas, Technical Manager R+D Area of Magtel, 25 June 2015 (<http://goo.gl/7in81k>).
 - ◇ "European regional cooperation in the new 2014-2020 period". D^a. Inmaculada Valencia Bayón, General Director of Economy and European Affairs for the Government of Cantabria and Managing Authority for the SUDOE Programme, 10 September 2015 (<http://goo.gl/wrlrwu>).
 - ◇ "Ubago: Innovation and tradition in the production and distribution of marine products". Dr. José Ignacio de la Fuente, Director of R+D+i, UbagoGroup Mare, 5 November 2015 (<http://goo.gl/75hwCl>).
 - ◇ "Ayesa: Innovation for a more sustainable world", D. Santiago Blanco Polo, Director of Innovation, Ayesa, 2 June 2016 (<http://goo.gl/TUD6p7>).
 - ◇ "BEDSON Europe". Dña. Rosa Rico Blanco. "Natural additives to improve animal health, 15 June 2016 (<http://goo.gl/C3SPGt>).



- ▶ Knowledge Transfer Days, *workshops* with companies and other activities with *stakeholders* in the Blue Economy field.
 - ◇ Participation in **The European Forum for Science, Technology and Innovation - Transfiere 2013**, on 13 and 14 February 2013 in Malaga, where we participated in 35 bilateral meetings with companies (<http://goo.gl/2ZRzqt>).
 - ◇ Participation with a **stand in the European Forum for Science, Technology and Innovation - Transfiere 2014**, on 12 and 13 February 2014 in Malaga, where we participated in 29 bilateral meetings with companies (<http://goo.gl/G23Y6U>).
 - ◇ Participation with a **stand in the European Forum for Science, Technology and Innovation - Transfiere 2015**, on 12 and 12 February 2015 in Malaga, where we registered 32 technological profiles (<http://goo.gl/tvFLP0>).
 - ◇ Participation with a **stand in the European Forum for Science, Technology and Innovation - Transfiere 2016**, on 11 and 12 February 2016 in Malaga, where we participated in 20 bilateral meetings with companies (<http://goo.gl/Qj9UzV>).
 - ◇ Organisation of Knowledge Transfer Days in the Aquaculture sector: "R+D+i, an opportunity for aquaculture development in Andalusia", 24 and 25 October 2013 in the IFAPA Centre Los Toruños. Researchers from all sections of **CEI-MAR** participated as well as those from Aquaculture Technology Centres (CTA-QUA), and companies from the sector (<http://goo.gl/qYwgxe>).
 - ◇ Organisation of "Blue Economy: a Sea of Opportunities" Study Day (<http://goo.gl/ChV9aH>).
 - ◇ Agreement with the Ministry of Science, Technology and Productive Innovation for the Republic of Argentina., 27 May 2014 (<http://goo.gl/EJL5fU>).
 - ◇ Agreement with NAVANTIA, 12 June 2014 (<http://goo.gl/3A4rML>).
 - ◇ Study days on coastal aquifers and desalination plants (UAL), 11 and 12 Nov 2014 (<http://goo.gl/oyizuA>).
 - ◇ R+D+i financing days in companies (Link to news 05.06.2013, <http://goo.gl/YdSNBg>).
 - ◇ Meeting with Tecnia corporation (Link to news 12.06.2013, <http://goo.gl/ZDaL9o>).
 - ◇ Meeting with Acerinox group (Link to news 09.07.2013, <http://goo.gl/RGvgKr>).
 - ◇ "World Water Day" Study Days, 2013-2016, held with companies from the sector (Link to news: <http://goo.gl/oyizuA>) (<http://goo.gl/YztTsA>).
 - ◇ Inclusion in Andalucía Blue Tech local action group (<http://goo.gl/9MGAVP>).
 - ◇ **CEI-MAR** - NAVANTIA Agreement (<http://goo.gl/c3kxif>)
 - ◇ **CEI-MAR** – Bahía Almeriport Agreement (<http://goo.gl/NpZkwr>).
 - ◇ Workshop with the company, SAES, 11 June 2015 (<http://goo.gl/xIUYuu>).
 - ◇ Joint meeting with companies from the Association of Renewable Marine Energy Producers (APPA **MARINA**) and the Naval Maritime Cluster, 15 June 2015 (<http://goo.gl/UyNkE2>).
 - ◇ Workshop with the company, ELIMCO, 2 July 2015 (<http://goo.gl/XL3Dhc>).
 - ◇ Meeting between institutions Abengoa - **CEI-MAR** for joint activities, 8 July 2015 (<http://goo.gl/bKh2l6>).
 - ◇ Participation in the II MEETING FOR THE CTAQUA WORK GROUPS 2015, held in El



- Puerto de Santa María (CTAQUA Installations), 29 September 2015.
- ◇ Technological Challenges Study Day for Processing Sea Products, in CTAQUA, on 10 February 2015 (<http://goo.gl/3loF6g>).
 - ◇ CEI-MAR's participation in the opening plenary for Andalucía Innovation Strategy 2020, presided by the President of the Andalusian Regional Government, in Malaga on 4 March 2015.
 - ◇ Organisation of "II Workshop Somos Atlánticos", on 26 November 2015 (<http://goo.gl/tUKXza>).
 - ◇ Attendance of the partnership's researchers and specialists at meeting events for stakeholders regarding international programmes: *Interreg VB Sudoe Programme* (in Santander, on 7 and 8 October 2015), *Seminar to launch and present the first call for the POCTEP programme in INTERREG V* (Portalegre Portugal, on 23 October 2015), *Brokerage Event: Dual-use technologies* (Seville, 27 and 28 October 2015), *Atlantic stakeholder platform conference*, (Brest, France, 29 October 2015), *First regional seminar for the cooperation area 5 of the POCTEP programme and presentation of the COOPERA 2020 application* (Seville, 4 November 2015), *VIII Seminar to prepare proposals for the Research and Innovation Framework Programme Horizon 2020* (Antequera, Malaga, 1 and 2 December 2015), *Atlantic stakeholder platform conference*, (Porto, Portugal, 20 and 21 January 2015).
 - ◇ Responsible for *Workshop 2B "Strengthening Atlantic competitiveness: the opportunity of a Maritime Entrepreneurship Ecosystem Project"* as part of the *3rd Atlantic Stakeholder Platform Conference*, to be held on 27 September in Dublin (<http://goo.gl/0MwaU4>).
 - ◇ Participation in the *Workshop APBA 2020*, organised by the same institution, in Algeciras on 19 November 2015.
 - ◇ Participation in the *Shipyards 4.0* study day organised by the Cadiz Naval Maritime Cluster on 25 November in Cadiz, (<http://goo.gl/46uSHo>).
 - ◇ Meeting with the Port Authority for the Bay of Cadiz and Telefónica to study an innovation project, on 10 November 2015 in Cadiz.
 - ◇ Meeting with the President of the Port Authority for the Bay of Algeciras and other positions in the APBA on 19 June 2015.
 - ◇ *Workshop* with Navantia, on 9 February 2016.
 - ◇ Meeting with Red Eléctrica, to study collaboration projects with the CEI-MAR Foundation. 18 March 2016.
 - ◇ Agreement with the Official College of Marine Engineers of Spain, 13 April 2016.

4. CEI-MAR's institutional boost to business innovation projects.

We must begin this section by stating that there have been a total of 1,530 contracts and collaborative projects carried out with companies from the partnership in the period of 2012 to June 2016. 1502 are national projects and 28 are European. We would like to highlight the following innovation projects (national and European), either because they have been backed institutionally by CEI-MAR, or because they have had a considerable impact or even because they have led to new initiatives:

- ◇ "Fouling resistant ceramic honeycomb nanofilters for efficient water treatment", project FP7 to be developed between 2012 and 2017. The consortium includes the company Cyclus ID SL and its objective is to develop a ceramic honeycomb



nanofilter membrane, with a membrane area that reaches 25 m² (<http://goo.gl/ajcLqx>).

- ◇ "Sustainable PoLymers from algae Sugars and Hydrocarbons" (splash), project FP7 to be implemented between 2012 and 2017. The consortium includes companies as diverse as Avantium or Biotopic and its objective is to develop an industrial bioplatform using microalgae as a renewable raw material for the sustainable production and recovery of hydrocarbons and polysaccharides from the *Botryococcus braunii* species and subsequently convert it into renewable polymers (<http://goo.gl/PcgS80>).
- ◇ "Support to Aquaculture and Fisheries Industry" (SAFI), project FP7 to be implemented between 2013 and 2016. Its objective is to exploit Earth Observation resources to develop the aquaculture and fisheries industry in marine coastal regions (<http://goo.gl/pAB44m>).
- ◇ "Multi-product Integrated bioRefinery of Algae: from Carbon dioxide and Light Energy to high-value Specialities" (MIRACLES), project FP7 to be implemented between 2013 and 2017. Its consortium includes companies as diverse as Fito-plancton Marino or Ewos and its objective is to develop integrated biorefinery technologies to produce specialities from microalgae to use in food products, aquaculture and non food products (<http://goo.gl/PoLhZD>).
- ◇ "Action plan towards the Smart Port concept in the Mediterranean Area (SMART PORT)", carried out in 2014 and 2015, together with the Andalusian Institute of Technology and other partners, funded by Interreg MED (<http://goo.gl/YB1pgB>).
- ◇ "Development of Microalgae-based novel high added-value products for the Cosmetic and Aquaculture industry", Project H2020 approved in 2016. Its consortium includes the company Fito-plancton Marino and its goal is to combine basic and applied multidisciplinary research in the field of 'omic' technologies, biochemistry and applied biotechnology, allowing the microalgae industry to get access to alternative markets (<http://goo.gl/mbRbd6>).
- ◇ "Design and analysis of control strategies for autonomous navigation of marine vehicles" with NAVANTIA, within the mega project ADAM led by Boeing with the participation of other industrial partners such as NAVANTIA and university centres. Carried out between 2012 and 2014. It was useful for designing the first dynamic ships positioning system developed in Spain. With co-financing from the CDTI. (<http://goo.gl/D8BnEr>).
- ◇ "Command and control, Integration and Training for Interoperable Unmanned Systems (CITIUS)", carried out between 2013 and 2015 in collaboration with NAVANTIA and other partners. This project has enabled the production of unmanned marine vehicles. With co-financing from INNTER-CONECTA. (<https://goo.gl/p8AqLq>).
- ◇ "Development of LNG's robotised welding process", carried out between 2014 and 2015 together with Navantia. The project enabled the robotised process of welding boat elements, to move towards Shipbuilding 4.0. Funded by Navantia.
- ◇ "Development of materials and additive technology for the production of cabins in the shipbuilding sector. 3D Cabins". Project to be developed with Navantia in 2016. Its objective is to produce ship cabins through additive manufacturing by 3D printer, within the concept of Shipbuilding 4.0. It forms part of one of the entrepreneurial innovation and regional



development projects already commented. (<http://goo.gl/Ma7ar7>).

- ◇ "Use and study of the feasibility of using marine micro-organisms to obtain sugars and marine fats". Carried out and funded in 2013 with APONIENTE (<http://goo.gl/vvaZcu>).
- ◇ "Improving the performance of the fish-processing industry through high added value products (VALORA)", carried out in 2014 in collaboration with the Technological Centre of Aquaculture of Andalusia (CTAQUA), Three Seas Group (Galicia), Esteros de Canela (Huelva). The results achieved have made it possible to minimize the impact caused by the by-products generated within aquaculture and increase the profitability of the marine processing sector through new product development. With co-financing from the Biodiversity Foundation. (<http://goo.gl/yqoeir>) and (<http://goo.gl/CFqVvo>).
- ◇ "Application of scientific and technological knowledge in Andalusia in order to develop a process of bioactive compound extraction from microalgae", initiated in 2015 and ending in 2017 with ENDESA and other entities, co-financed by CTA.
- ◇ Research in algal biomass concentration processes through vacuum membranes, developed in 2013 with the company AQUALIA GESTION INTEGRAL DEL AGUA, S.A.
- ◇ "Marine chlorella biomass exploitation process to produce carotenoids and fatty acid concentrates" (<https://goo.gl/wNa0RU>).
- ◇ "Effects of Spirulina microalgae platenis on growth and metabolic parameters in the Sparus aurata", with the company LifeBIOENCAPSULATION, S.L, initiated in 2016.

- ◇ "Identification of technological and innovation opportunities for the reindustrialisation of the Bay of Cadiz", developed together with TECNALIA after the EOI tender, between 2014 and 2015 (<http://goo.gl/g5i6oZ>). With co-financing from EOI. Consequences of this project include the creation of the Saltworks cluster and the creation of a catalogue of entrepreneurial areas based on the exploitation of endogenous resources from the Bay of Cadiz Natural Park.
- ◇ "Valuing the role of aquaculture in the promotion of bird life diversity in the context of the Natura 2000 network (AQUABIRD 2000)", carried out in 2014 in collaboration with the Technological Centre of Aquaculture of Andalusia (CTAQUA), Group Culmarex (Community of Murcia), Isla Mayor Fishery (Veta La Palma) in Doñana. This project was useful for **identifying** and **valuing the native stock** and ecosystem services which provide for aquatic birds in areas where models of sustainable aquaculture have been developed. With co-financing from the Biodiversity Foundation. (<http://goo.gl/b73RPa>).

With regards to their **own programme of business innovation and regional development projects**, the four projects that have been selected (<http://goo.gl/6flwo1>) and are currently running are:

- ▶ Navantia project: *Developing materials and additive technology for manufacturing cabins in the shipbuilding sector. 3D Cabins*. Its objective is to produce cabins for vessels by selecting and researching the most suitable materials, as well as the implementation of this technology in a 3D printing machine that manufactures them. Project to be developed with the collaboration of the research group: *Materials and nanotechnology for innovation* (UCA).



- ▶ Mar Cristal Marilum Project: *Bioluminescence and gastronomy*. Its purpose is to deepen gastronomic research and innovation based on the use of marine resources and on the use of new techniques, methods and tools in gastronomy that lead to new biotechnological uses. The use of bioluminescent microorganisms in gastronomy. Project to be developed with the collaboration of the research groups: *Applied Microbiology (UCA)* and *Phytoplankton Ecophysiology and Biology (UCA)*.
- ▶ Biothesan project: *Ecodunaliella: Technical and economic study on primary production as a new path of development through activities that are consistent with the traditional use of the Andalusian saltworks*. They will focus on different aquaculture species, both marine and inland, and research in areas relating to Biology and Marine Sciences. Project to be developed with the collaboration of the research group *The University of Granada Herbarium as a source of taxonomic, environmental and biodiversity studies (UGR)* and the Technological Centre of Aquaculture of Andalusia.
- ▶ PhycoGenetics project: *Design and extraction of functional phytoplankton*, whose objective is the research, development and production of high biotechnological value added products in microalgae and other plant cells. Project to be developed with the collaboration of the following research groups: *Biotechnology of natural products (UAL)* and *Biotechnology of Microalgae (UHU)*.

5. Setting Science-Technology-Business priorities in R+D+i that are related to the marine-maritime sector.

- ▶ Design of a complete catalogue of CEI·MAR Science-Technology-Business capabilities.
- ▶ Creation of a catalogue of facilities for joint use agreed by the partnership. (Download

at: <http://bit.ly/2c7m89n> and <http://bit.ly/2c4eQTD>).

- ▶ Set the R+D+i priorities for the inter-relationship between Science- Technology-Business in the marine-maritime field.

6. Catalogue of CEI·MAR's technological capabilities of interest to business innovation and dissemination of capabilities.

Creation of the full catalogue of the partnership's technological capabilities for business innovation (<http://goo.gl/dr11ZP>).



INTERNATIONALISATION ACTIVITIES

The internationalisation strategy activities in terms of enhancing the inter-relationship between Science, Technology and Business have been mainly based on "Raising the international profile of our research applicable to business innovation needs". These activities have been featured in subsection 1 of the Description of Work Accomplished. From this, we would like to highlight the creation of the partnership's delegation in Brussels, the inclusion of 5 European project dedicated members of staff, the membership's involvement in 4 important Horizon 2020 initiatives (public-private partnerships), the *Vessels for the Future (VftF)* initiative, as well as the partnerships' collaboration in setting up the *Blue Growth (BG)* partnership and gaining 63 European projects, the seventh Framework Programme, Horizon 2020 and regional cooperation programmes financed with FEDER funds.

Both technicians and researchers assisted the H2020 *Info Day* and *Brokerage Event*, as well as other international meetings related to setting up programmes where cooperation is the backbone for innovation. This is especially true in the case of the European Commission's Atlantic



Strategy, via the Atlantic Action Plan. It is also worth highlighting that we organised "II Workshop Somos Atlánticos" and that we are responsible for *Workshop 2B "Strengthening Atlantic competitiveness: the opportunity of a Maritime Entrepreneurship Ecosystem Project"* as part of the *3rd Atlantic Stakeholder Platform Conference*, to be celebrated on 27 September in Dublin.



MAJOR SETBACKS IN PROGRESS TOWARDS ACHIEVING GOALS

There have not been any setbacks in relation to the initial aims. In fact, on the contrary, progress has been significantly greater than originally anticipated, to the extent that the activities to enhance the inter-relationship between Science, Technology and Business have had a far greater influence than could have been anticipated at the start.



View of the Port of Algeciras



SECTION B.4. CEIMAR Innovation Ecosystem: Boosting the Blue Economy

Strategic area	Scientific and Knowledge Transfer Improvement
Programme	CEI-MAR Innovation Ecosystem: Boosting the Blue Economy
Objectives	<i>Objective: Drive cooperation among the partnership's main participants to promote innovation, the entrepreneurial spirit and to create value in the areas of specialisation proposed by the Campus.</i>
	<p>The 2011 CEI-MAR REPORT mentioned how the current competitive economic environment intensifies the challenges faced by those in marine-related social, economic or training fields. It requires additional innovative effort to guard its competitive capacity, opening up new value creation spaces. In this context, scientific research and technological development linked to the needs of the productive sector are the foundation of the innovative process. CEI-MAR has proposed the creation of an innovation ecosystem to generate new knowledge, ideas and technologies in the form of new valuable products and services for the market, thereby generating wealth and social well-being. The idea is that all involved in the innovative process interact in a harmonious way, collaborating together and maximising available resources through the partnership.</p> <p>From early 2013, CEI-MAR has focused on international innovation and economic growth possibilities in the marine-maritime field. Our programmes have been designed using the relevant European strategies as a reference guide. These are taken from the European Union H2020 Research and Innovation Programme and the specific <i>Blue Growth</i> strategy from the <i>European Commission's Directorate-General for Maritime Affairs and Fisheries</i> (already mentioned in section B.1.). This has become the reference framework for our programmes and is held as a reference for our R+D+i work.</p> <p>Aside from the international scene, we have also been active in our cross-country geographic area of influence, coordinating ways of gathering key players in the Blue Economy (large companies, SMEs, technology centres, public administrations, financial institutions, technological platforms, innovative entrepreneurial partnerships, port authorities and CEI-MAR) especially through the <i>Platform for the Blue Economy</i> (in section B.1. we have already referred to the Blue Economy concept and to the <i>Platform</i>) and clusters. All this has enabled cooperation and has encouraged innovation, the entrepreneurial spirit and value generation, boosting, embodying and developing an innovation ecosystem around the marine and maritime economy fields.</p> <p>The initiatives that have been developed around the Blue Economy have had a significant social and political impact (which we will make reference to in section C.1.) and the work accomplished by CEI-MAR on strategies for smart growth in the marine-maritime sector, has been incorporated into the <i>Regional Research and Innovation Strategies for Smart Specialisation</i>, both for the Algarve and for Andalusia, as has been mentioned in section B.3.</p>

B.4. BLUE ECONOMY



Therefore, given the relevance of this strategy and the forums where it originated, the “Innovation Ecosystem” Programme has been redefined and established through the Programme, **“Innovation Ecosystem: Boosting the Blue Economy”**. The activities organised to build relationships of trust between the companies and those of CEI-MAR and to learn about their needs and expectations were mentioned in the objectives of section B.3. ‘Enhancing the inter-relationship between Science, Technology and Business’ and are inextricably linked to an Innovation Ecosystem. For this reason, in most cases it is not necessary to mention them again here. We will focus our interest on the following specific objectives:

- ▶ Determine growth and economic development opportunities based on applied knowledge, in the Blue Economy field, with an international perspective.
- ▶ Promote the appearance of the Blue Economy sectors in development focuses and as priorities in the *Regional Research and Innovation Strategies for Smart Specialisation (RIS3)* for European regions where the CEI-MAR partnership operates.
- ▶ Encourage interest in the Blue Economy, innovation in relevant companies and cooperation between members of the partnership, companies and institutions to embark upon collaborative projects in the Blue Economy sector.
- ▶ Promote the creation of technological facilities which support business innovation in the marine and maritime sectors and shipbuilding economy.

INITIAL OBJECTIVES FROM THE 2011 PROPOSAL

The 2011 Report proposed the following objectives: Drive cooperation among the partnership's main participants to promote innovation, the entrepreneurial spirit and create value in the areas of specialisation proposed by the Campus as well as an innovation ecosystem.

In addition, the sub-programme Fortalecimien to 2011, under the name “Innovation Ecosystems”, financed actions to enhance activities related to transferring research knowledge to companies as well as generating technological companies in innovative areas for Campuses of Excellence. Thus, in the 2011 report, there was a proposal to make an Innovation Ecosystem in the form of a “Virtual Forum Meet” for all who

participate directly or indirectly in the R+D+i network. It was also intended to boost new areas of work and attract or generate talent, which in turn, boosts knowledge transfer and innovation on the Campus.

With the development of the Campus, since early 2013, we wanted to and have been able to be more ambitious and host a series of forums, work groups, scientific-business clusters and work groups that incorporate CEI-MAR researchers and companies, as one of the ways to enhance the inter-relationship between Science, Technology and Business and facilitate an Innovative Ecosystem.

An essential and central aspect of this strategy has been to focus on the innovation and growth that the *Blue Economy* offers internationally, in order to coordinate a marine, maritime and shipbuilding innovation ecosystem which we have redefined and established as the *Innovation*



Ecosystem: Boosting the Blue Economy. Therefore, the objective remains the same as in 2011, but with a broader scope.



DESCRIPTION OF WORK ACCOMPLISHED

CEI-MAR has become an indispensable tool in the marine-maritime economic development of our geographic area of influence and in societal progress (stimulating and supporting business innovation and regional development) on an international scale.

With the impetus of the Inter-institutional Commission for Knowledge Transfer, activities have been carried out to enhance the relationships between the business sector and the **CEI-MAR** partnership research groups. For this, various activities were organised including themed *workshops*, knowledge transfer days, informal meetings and other initiatives with the objective of creating a bridge of communication between Campus research and the innovation needs felt by companies because innovation needs everyone together to align their efforts with a collaborative and committed focus. In fact **creating an innovation ecosystem requires environments of trust to be created which promote collaboration, as well as the acknowledgment of the needs and expectations of the members of this ecosystem.**

For this reason, all enhancement activities initiated by **CEI-MAR**, commented in the previous paragraph and laid out in section B.3., were useful in generating relationships of trust and making the needs and expectations of the productive sector known. And it is exactly for this reason that these activities were naturally redirected to broaden the scope of our vision, incorporating new participants and new strategic areas of work, until we re-envisaged all this work into one single objective: that of boosting the Blue Economy, supporting innovation in that sector and setting in place the core innovation ecosystem focuses.



CEI-MAR has led the platform for the Blue Economy in Andalusia

In addition, it is known that the interactions between various innovation participants and the generation of trust grow exponentially with personal contact. For this, it is essential to connect research centres to manufacturing centres and companies in general, **taking advantage of regional proximity in order to coordinate an innovation ecosystem**, independent of the internationalisation thrust that it would surely have.

Thus, **CEI-MAR** has worked on building relationships and spaces that provide the opportunity to approach innovation in every area (*technological, non-technological, social*), in each of the regions in our geographic area of influence. This helps companies and entrepreneurs place an efficient focus on the strategic objectives of each region in order to generate new opportunities as well as socio-economic development with **CEI-MAR** acting as coordinator of this innovation network.

All this sets a path to follow in order to launch an Innovation Ecosystem which consists of the activities which correspond to the specific objectives laid out in the first paragraph of this section.

1. Determine growth and economic development opportunities based on applied knowledge in the Blue Economy field.

Determining growth opportunities, based on incorporating knowledge into products, processes



Blue Economy in Andalusia is one of the titles in the CEI-MAR monography collection



The platform for the Blue Economy presents the situation and opportunities report, encouraged by CEI-MAR, to the Andalusian Government

and services is an important factor in setting up the Innovation Ecosystem. An internal inter-institutional committee was set up to determine growth opportunities in sectors of the economy linked to marine and maritime activities (with the participation and involvement of all partners) which linked international opportunities with the R+D+i strengths of the partnership. As a result of the analysis carried out, it was decided that the Blue Economy concept would be incorporated into CEI-MAR's main strategy. Work groups were set up, mostly made up of representatives from companies in the marine and maritime sector. Their mission was to identify business innovation areas that would enable the development of economic growth and social progress in related entrepreneurial activities. In this sense, it worked in close collaboration with innovative companies and others involved in innovation from the three regions that form our geographic area of influence.

In addition, the conditions set by the European Commission for European regions opened up access to social cohesion funds. This created a very favourable situation for launching and developing the marine-maritime innovation ecosystem in these regions. Thus, the Algarve and Andalusia became very favourable areas for launching the initiative "Innovation Ecosystem: Boosting the Blue Economy" as our initiative fed into the Regional Strategy for Smart Specialisation initiative.

In Andalusia, the *Platform for the Blue Economy* was established. It is a technological platform, made up of representatives from business institutions (business associations, large companies, SMEs, technological centres), port authorities and of course CEI-MAR who leads it.

The *Platform for the Blue Economy* worked intensely on analysing Andalusia's assets in terms of its marine-related economic activity. It also determined opportunities for business innovation, which would enable international competitiveness for companies and economic growth.

The first result of this work materialised in the book *The Blue Economy in Andalusia* (ISBN 978-84-9828-469-0), which describes the scientific-technological capabilities, scientific facilities and socio-economic data linked to marine activity as well as the strong existing links between the scientific institutions, technological centres and companies which set up a science and technology network operating in close cooperation to serve economic and social development, business growth and strengthening as well as job creation in the Blue Economy field.

In Section B.1. it was defined what the term Blue Economy means, stating that it is a broad, inclusive and forward-looking concept which covers all economic activity related to oceans, seas, ports and coastal areas. Generally speaking, the Blue Economy is that which derives from any business activity linked to the use and exploitation of



the sea. Therefore, we must specify that various fields are relevant such as: (1) Renewable marine energies; (2) Shipbuilding and *Offshore*; (3) Marine aquaculture; (4) Maritime, coastal and cruise tourism; (5) Port management and port logistics; and (6) Marine biotechnology. All these growth areas are areas of interest to CEI-MAR.

The assets related to the *Blue Economy in Andalusia* are grouped into **six priority areas**, within which **29 fields of innovative opportunities** are identified for regional economic growth in the marine and maritime sector, divided into five areas: Port logistics and maritime transport, Marine resources, Shipbuilding Industry and Offshore, Renewable Marine Energies and Tourism linked to the sea.

This document, as has been pointed out in section B.1., was extremely useful in encouraging companies and the scientific community to start working together to design innovative projects connected to our potential and based on transferring knowledge coming from research, development and innovation in the marine and maritime fields (as happens with the projects with various companies mentioned in section B.3.). Specific cases of this clear innovation ecosystem objective embody these values (the outworkings of collaborative innovation projects).

In the Algarve, CEI-MAR has been involved in determining their Strategy for Smart Specialisation through the *University of the Algarve* which has directly participated in writing the strategy and has even been part of the Technical Editing Team for it. This has facilitated dialogue between companies, business associations, technological centres and others involved in innovation in the Algarve region with 40 forums and 17 innovation workshops in which 140 entities have participated, including companies and others involved in innovation.

2. Incorporate the Blue Economy into the RIS3 development focuses and priorities (Algarve and Andalusia).

As previously mentioned, in section B.3. RIS3 was described. Its importance obviously lies in the

fact that it defines the Innovation Strategy for the corresponding European region and clearly determines which areas of economic activity could benefit from competitive financing programmes with European funds. Consequently, marine-maritime economic activities needed to be included in these strategies in order to facilitate the launch and upkeep of an Innovation Ecosystem, which boosts the Blue Economy.

The document *The Blue Economy in Andalusia* was presented on 26 November 2013 to the President of the Committee, Director of ANDALUSIA RIS3, with the intent of being considered in the regional policy definition of economic development. <http://goo.gl/qcdWbg>

The importance of the work accomplished and the collaborative and committed attitude of CEI-MAR in subsequent technical meetings held with staff from the Andalusia Agency of Innovation (IDEA) meant that 90% of proposals made to the Andalusia RIS3 were used in various official documents (<http://goo.gl/wxfT4U>). For example, "Vision of Andalusia", "Priorities for Smart Specialisation" and "Catalogue of Innovative Opportunities".

Thus, contributions from this document are in two thirds of the "Vision of Andalusia" where it mentions AQUACULTURE, RENEWABLE MARINE ENERGIES, MARITIME TRANSPORT INDUSTRIES and the characteristic of Andalusia as a region OPEN TO THE SEA, specifically mentioning the blue economy.

Furthermore, contributions from the document *Blue Economy in Andalusia* feature in six of the eight Andalusian Government's "Specialisation Priorities" ensuring funds to sustain entrepreneurial innovation activities in the marine and maritime sector. Thus, innovation should be treated as a priority in:

- **Mobility and logistics**, featuring the important international dimension in port activity and the importance of CEI-MAR. Our contributions in this field are featured in two of the action areas.



- ▶ **Consolidate the transport industry**, featuring the shipbuilding industry. Two of the action areas discussed incorporated our contributions in relation to the shipbuilding industry.
- ▶ **Sustainable use of locally-generated resources**, where CEI·MAR is important and the following areas are featured: the recovery of salt marshes to use as traditional and industrial saltworks, aquaculture, algal culture and the restoration of run-down coastal areas. Here, there are again two programme areas that incorporate our contribution to the field.
- ▶ **Andalusia's potential as tourist, cultural and leisure destination**. Four programme areas include our contributions.
- ▶ **Research and innovation in agroindustry and healthy eating**. Our contributions are included in three of the action areas.
- ▶ **Encouraging renewable energies, energy efficiency and sustainable construction**. Our proposals are included explicitly in the action area for developing renewable marine energies.

In the CEI·MAR study days held in January 2014, this strategy and the document created were incorporated as priority objectives by the rectors and directors or representatives of the Campus PRIs as well as the CEI·MAR Foundation board of trustees, determining that this area of work was essential and that CEI·MAR could act as an impetus for regional economic growth. <http://goo.gl/3i6alF>.

Regarding financing guarantees for business innovation in the Algarve region, the document *Regional Strategy for Research and Innovation for Smart Specialisation (RIS3 - ALGARVE 2014-2020)*, discusses economic activities in the marine sector in the various strategy areas, and as part of them, the various action areas and priority activities. This is especially the case in the following areas: *Sea; Tourism; Renewable Energies; and Health, Well being and Life Sciences*.

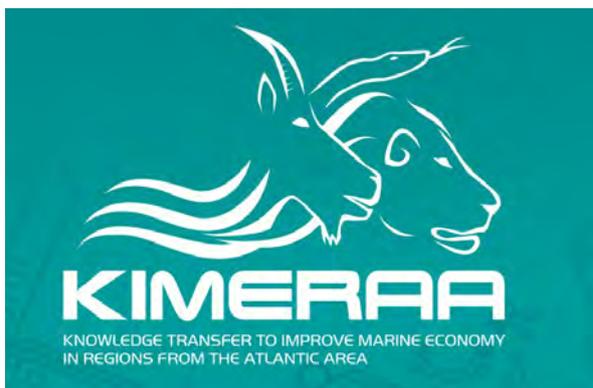
Both activities directed their efforts to securing FEDER funds for the 2014-2020 period which enabled them to support Blue Economy business innovation in the south of Spain.

3. Boosting the Blue Economy, its knowledge, innovation and cooperation among members of the partnership, the companies and institutions to encourage collaborative projects.

Following on from the three projects mentioned, work has been done to disseminate the information and a network of connections has been built to favour the successive incorporation of new companies into the Blue Economy momentum through innovation.

On 5 May 2014, the Study Day: *The Blue Economy: a Sea of Opportunities* took place featuring the main innovative companies in the marine and maritime field, focusing its work on analysing opportunities for innovation (in the following sectors: *Marine Resources, Port Logistics, Transport and Tourism, Shipbuilding Industry and Offshore Renewable Energies*), through the establishment of five thematic work groups.

Additionally, CEI·MAR has participated in *Transferring Knowledge to Improve the Marine Economy in Regions from the Atlantic Area* (KIMERRAA) project, completed in 2014, coordinated by the University of the Algarve (UAlg) and funded by the Atlantic Europe Programme, whose main objective was to build strong connections between companies and the scientific community with a focus on marine science and related activities, contributing to the progress of the Atlantic Area regional economy <http://goo.gl/DC4QwS>. More specifically, KIMERRAA enabled the creation of a directory of companies in the Blue Economy field (in particular, for the Algarve and Andalusia) along with a burgeoning network of knowledge transfer in Atlantic Europe. A result of greater interest in the building and enhancing of a CEI·MAR marine-maritime Innovation Ecosystem.



The Kimeraa project, coordinated by CEIMAR and University of Algarve, focused on knowledge transfer to improve Blue Economy in regions of the Atlantic Area

On 14 May 2014, we ran the *Marine Knowledge Transfer Day*, at the University of Huelva, in which KIMERAA projects and the Platform for the Blue Economy came together. <http://goo.gl/dp7J5M>. This day was coordinated by CEI-MAR as part of its internal strategy but it is also featured in its international strategy especially for the European Atlantic area where strong alliances with other stakeholders have been established, both through specific consortia to boost marine-maritime innovation, and through the impetus of participating and organising events such as the *II Workshop We Are Atlantic*.

As part of our work promoting the importance of innovation in the Blue Economy and promoting cooperation between the partnership, companies and institutions, we ran a summer course at the University of Cadiz for three days between 7 and 9 July 2014 "*The Blue Economy: Andalusia and the Sea*", to foster the marine-maritime Innovation Ecosystem. It was organised as a forum for knowledge transfer and debate around three main areas: *European cohesion policy and the sea; Building networks: Universities and the sea, Blue growth and R+D+i policy; Building networks: Companies and the sea*. It featured prominent speakers, including: Jorge Garcia Reig (Deputy Managing Director of Regional Programming and Community Programmes Evaluation for the Directorate-General of Community Funds in the Spanish Ministry of the Finance and Public Administrations), Eva



CEI-MAR has worked together with all involved in marine-maritime sectors, such as the Port of Algeciras, the 1st in Spain and 5th in Europe.

Maria Vázquez Sánchez (Managing Director of Research, Technology and Business for the Ministry of the Economy, Innovation, Science and Employment of the Andalusian Regional Government), the coordinators of the Marine Campus of Excellence: Campus do Mar, Mare Nostrum, Tricontinental Atlantic Campus and CEI-MAR and Luis Delgado Martinez (Advisor to the Secretary General of Universities of the Ministry of Education, Culture and Sports), Clemente López Bote, Deputy Managing Director of Directorate-General Scientific and Technical Research projects from the Ministry of Economy and Competitiveness, Carmen Sillero Illana, Area Coordinator for the IDEA Agency Strategies and Programmes, Cristina Amil López, Policy Officer (Maritime policy) in DG-Mare of the European Commission, Juan Manuel Garcia of Lomas Mier (Manager of the Technological Center of Aquaculture of Andalusia, Elena Corrales (Development Coordinator of Dragados Offshore), Frank Rogalla (Director of Innovation and Technology of Aqualia), Andre Ancaes (Executive Director of Turmares Tarifa, S.L.), Pedro Miguel Mayorga Rubio (Technical Director of EnerOcean, S.L). <http://goo.gl/SYQM2a>.

There have also been dozens of meetings, workshops and study days held with companies and key institutions in some of the sectors, with a double objective: to more clearly determine the R+D+i interests of the different sectors and lay the foundations for future collaborations.



Knowledge Transfer Seminar for the marine sector, held at the University of Huelva



Prominent companies such as Endesa, Telefónica and Santander bank have joined the CEI-MAR Foundation as trustees

Finally, incorporating large companies, financial institutions and business associations onto the **CEI-MAR Foundation** board of trustees provides substantial support when launching and developing an Innovation Ecosystem in the marine-maritime sector. It enables us to determine innovation areas of interest to companies and then adjust the partnership's research focuses to coincide with these proposals, generating research and collaborative innovation projects, which have an immediate impact on social progress.

As a result of all this work, steady collaboration areas have been initiated with companies to deal with serious problems (to be carried out gradually over the next few years), for example:

- ▶ The development of new technologies aimed at minimising costs for Marine Renewable Energies with ENDESA and Enel Green Power and other companies and entities in the renewable marine energies sector.
- ▶ The incorporation of a systematically robotised welding boat to the industrial construction process, as well as the reorganization of the productive process, with Navantia and subsidiary companies from the Naval Maritime Cluster.
- ▶ The development of ICT technologies to deal with mobile signals to improve local trade

strategies in relation to cruise ship tourism, with Telefonica and port authorities.

- ▶ A project has been defined in the natural resources sector relating to the processing of fish and recovery of remains to generate pre-packaged food products together with the CTAQUA and companies from the marine aquaculture sector.

4. Promoting technological facilities which support business innovation in sectors of the marine, maritime and shipbuilding economy.

In the last five years, various attempts have been made to make our research known to society and let the challenges faced by society direct our scientific activity. In particular, as has been reflected in section B.3. and in this section, profitable inroads have been made into seeking and deepening collaboration with companies and using our research and knowledge to help their innovative activity. In this way, when working in close collaboration with the companies in our area, we can continually enhance technological projects for regional development that have a magnet effect to draw business to the region.

In an attempt to give back to our society we have the ongoing initiative **Centre of Business Knowledge Transfer (CTE)** to offer our services



CEI-MAR will include a Business Transfer Centre in the building which will be funded with regional FEDER funds (ITI)

to the productive sector, carry out research focused on their innovation needs, support innovative initiatives started by companies and at the same time **set it up as a space to accelerate innovative technological business initiatives and meet ups for companies and researchers, all within the framework of marine, maritime and shipbuilding activity**. Thus, this centre will promote research and innovation, offering their service to the productive sector.

The centre is designed to serve as a reference for knowledge transfer and also designed so that it is feasible to organise meetings with companies and demonstrations to solve specific problems. Furthermore, **CEI-MAR's** offices of Governance and coordination would move to the **CTE** as would the Confederation of entrepreneurs offices of innovation and those to be agreed with CADE (Business Development Support Centre) with the intention of concentrating in the same space all units which can give support, help and advice to set up collaborative innovation projects.

The **CTE** makes the **CEI-MAR** initiative a reality in its initial report to set up a Centre for Research and Transfer of Knowledge on the Southern European Sea (CIITMAR), as will be explained in section B.7. In this same section, details will be given on the services and departments that comprise its core.

The basic project in its implementation stage, safety and health study, site management and supervision went out to tender in the Official State Gazette no. 137, 7 June 2016. This centre will be financed with funds from the Integrated Regional Investment for Cadiz (ITI Cádiz), which has had the opportunity to obtain funds for a centre to support innovation and an innovation ecosystem, which from the beginning has been known as **CEI-MAR** CTE due to its geographic area of influence.

ITI Cádiz exists as a response to the emergency situation of the province of Cadiz with regards to employment and business innovation. The unemployment rate is over 41%, the largest in Spain. Spain's unemployment rate is practically half that of Cadiz's. Furthermore, the effects of the economic crisis have been worse in Cadiz where the impact has been noted more seriously, precisely because of the difficult situation it was in before the crisis due to the province's high unemployment rate. In order to address this serious situation, an initiative to boost the economy has been coordinated from all administrations and is co-financed with the European Union. It is called "Integrated Regional Investment" (ITI) and is part of the new 2014-2020 European framework for the province of Cadiz. ITI Cádiz is an adaptable instrument that allows an integrated application of regional strategies, allowing inter-agency groups to implement Operational Programmes and re-



sort to financing from various priority focuses from one or more operational programmes to guarantee the implementation of an integrated strategy for the province. An investment vehicle, through combined management of the main European funds (FEDER, FSE and FEADER) that will mobilise 1,293 million euros of these funds.

In addition, under ITI Cádiz, the **Centre for Advanced Manufacturing** will be set up with 20 M€ of investment which will support innovation projects in the shipbuilding industry where the first innovation projects are already being decided between **CEI-MAR** and the sector's industries.

Alongside these ongoing initiatives, another has been set up specifically for the processing and recovery of fish remains in collaboration with the Andalusia Technological Centre for Aquaculture (CTAQUA) and companies from the aquaculture sector, under the name **Centre for the Processing and Recovery of Marine Food Products**, which will be added to the CTAQUA installations.



ROLE OF THE PARTICIPANTS

The various members of the partnership have been actively involved in developing the work areas in the programme: "**CEI-MAR Innovation Ecosystem: Boosting the Blue Economy**". The planning and management body for the actions corresponding to this Programme is the Inter-institutional Committee for Knowledge Transfer, made up of representatives from each of the institutions. The programmes agreed are run by different entities through their representatives in these committees, the **CEI-MAR** coordinators in each entity and the manager of the **CEI-MAR Foundation**.

This procedure guarantees that all members of the partnership participate actively in all joint actions. This is not to say that one may not have more or less involvement depending on the specific programme and its characteristics.

All members of the partnership have participated equally in determining the opportunities for growth and economic development. Determining the innovation opportunities for the Blue economy in southern Iberian Peninsula went beyond the scope of our members, as we have mentioned, extending it to many companies and business institutions that represent the different sectors of activity involved. The inclusion of the Blue Economy in the RIS3 development focus and priorities for Andalusia has been possible thanks to the existence of the partnership and its recognition by the Andalusian Administration. The prestige of our research in the marine sector allowed us to play a role in defining the Smart Specialisation Strategy for the Algarve as part of the RIS3.

Due to their locations, the Universities of Cadiz, Huelva and the Algarve were heavily involved in organising the Study Days: *The Blue Economy: A Sea of Opportunities* and *Marine Knowledge Transfer*, as well as the course *The Blue Economy: Andalusia and the Sea*. Contracts with companies and planning to determine the main areas of collaboration for innovation between companies and the partnership have been organised by the Inter-institutional Committee for Knowledge Transfer and the **CEI-MAR Foundation** management.

The inclusion of companies into the **CEI-MAR Foundation** has been led by the **Foundation's** president. Finally, work to determine technological facilities which support business innovation in sectors of the marine, maritime and shipbuilding economies have held more weight specifically in the University of Cadiz due to the funds attributed to it, even though it was led by the Inter-institutional Committee of Knowledge Transfer, through its president and under the **CEI-MAR** global vision.





MOST SIGNIFICANT RESULTS

- ▶ Creating an innovation ecosystem in the Blue Economy field.
- ▶ Creating the *Platform for the Blue Economy*, a technological platform made up of representatives from various institutions, companies and research centres related to the marine sector.
- ▶ Compiling and editing the book, *The Blue Economy in Andalusia*, which has acted as an authentic programme for innovation in marine, maritime and shipbuilding sectors in Andalusia.
- ▶ Inclusion of CEI-MAR's contributions to the vision and priorities of Andalusian specialisation in the official RIS3 ANDALUSIA documents (<http://goo.gl/t9KAvH>).
- ▶ CEI-MAR's prominent participation in creating the RIS3 ALGARVE (<http://bit.ly/2cfynQl>).
- ▶ Different public events to present the strategy and its results. For example:
 - ◊ International Marine Campus of Excellence Study Day, 28 January 2014 (Links to news bulletins, <http://goo.gl/V3uywb>, <http://goo.gl/jQK6eH>).
 - ◊ Study Day *The Blue Economy: a Sea of Opportunities*, 5 May 2014 (Link to news bulletin, <http://goo.gl/LIKF5E>).
 - ◊ Study Day *Marine Knowledge Transfer*, 14 May 2014. (Link to news bulletin: <http://goo.gl/dp7J5M>).
 - ◊ The course "*The Blue Economy: Andalusia and the Sea*", from 7 to 9 July 2014. (Link to news bulletin: <http://goo.gl/SYQM2a>).
 - ◊ Joint study day with the Association of Renewable Marine Energy Producers APPA Marina, on 15 June 2015 (Link to news bulletin: <http://goo.gl/UyNkE2>).
 - ◊ Organisation of study day aimed at deepening the link between CEI-MAR capabilities and the innovation needs of the Blue Economy:
 - ◊ *The role of aquaculture in the conservation of aquatic birds*, held on 17 November 2014 (Link to the news bulletin: <http://goo.gl/Lseb0d>).
 - ◊ *Demolab*, on 11 December 2014 (Link to the news bulletin: <http://goo.gl/IW-9DD7>).
 - ◊ *Marine Resources on the Huelva Coast*, on 30 March 2016 (Link to the news bulletin: <http://goo.gl/qxSlnz>).
 - ◊ *Study Day II Workshop Somos Atlánticos* on 26 November 2015 (Link to the news bulletin: <http://goo.gl/tUKXza>).
 - ◊ Workshop on Marine Strategies together with the Ministry of Agriculture, Food and the Environment (MAGRAMA) and the University of Cadiz, on 14 July 2016 (Link to the news bulletin: <http://goo.gl/peBIFJ>).
- ▶ Incorporation of companies onto the CEI-MAR Foundation board of trustees. (Links: <http://goo.gl/NoGk5q>, <http://goo.gl/pYjmBo>).
- ▶ Leading the innovation committee for the Naval Maritime Cluster Management Board.
- ▶ The commitment to work on innovation areas to be developed by some companies and CEI-MAR (Link to the news bulletin: <https://goo.gl/hXKkeL>).
- ▶ Start of running the Centre for Entrepreneurial Knowledge Transfer on 7 June 2016 (Link to the news bulletin: <http://goo.gl/46Jiyt>).
- ▶ Start of Advanced Manufacturing Centre project. (Link to news bulletin: <http://goo.gl/Tlf0Cz>).



INTERNATIONALISATION ACTIVITIES

As it has been previously explained, building an **innovation ecosystem is made easier with regional proximity**, but this does not mean that its influence and vision remains local. To the contrary, competitiveness is international and consequently innovation must expand internationally as well. In fact, participating in international projects (especially European) should be an aim for those who work with the press, advice, support and positioning.

Along with the actions described previously, international expansion has also been a focus. Here are some highlights:

- ▶ Signing a collaboration agreement with the Andalusia Regional Government on 25 April 2014 so that CEI-MAR has a delegation in Brussels to enhance European projects, mainly for projects regarding the "Blue Economy" (<http://goo.gl/Qh2y56>).
- ▶ Signing a cooperation agreement on 27 May 2014 with the Argentine Ministry of Science, Technology and Productive Innovation as part of the Pampa Azul Project. (<http://goo.gl/EJL5fU>).
- ▶ Attending the *Workshop Somos Atlánticos*, in Santander on 25 March 2015.
- ▶ Attending the *Atlantic stakeholder platform conference*, in Brest on 29 October 2015.
- ▶ Organising the *II Workshop Somos Atlánticos*, on 26 November 2015 (Link to the news bulletin: <http://goo.gl/tUKXza>).
- ▶ Attending the *Atlantic stakeholder platform conference*, in Porto on 20 January 2015.
- ▶ Attending the *Atlantic stakeholder platform conference*, in Dublin, scheduled for 27 September 2016.
- ▶ Participating in the main initiatives of Horizon 2020 *Vessels for the Future* (<http://goo.gl/6S3SI2>) and *Bio-Based Industries, Sustainable Process Industry through Resource and Energy Efficiency (SPIRE)* (<https://goo.gl/mqjE53>), *Factory of the Future (FoF)* (<http://goo.gl/3q3QDY>), involved in work groups and meetings with the public-private partnerships.
- ▶ Participating in the *Blue Growth* forum promoted by CDTI to determine the Spanish position on the initiative of creating the *Blue Growth* PPP and for the consultation on programmes of work regarding Bioeconomy in Societal Challenge 2 of Horizon 2020.



MAJOR SETBACKS IN PROGRESS TOWARDS ACHIEVING GOALS

The initial aims have been exceeded and furthered greatly from what was proposed. In this way, networks have been established involving companies, CEI-MAR research, technological centres, regional governmental administrations responsible for supporting and encouraging innovation, entrepreneurs, business associations and others involved in innovation. Their relationships are based on trust and mutual knowledge of the needs and capabilities. Their objectives are framed around the regional innovation strategies (which they are supported by) but they also have an international focus, in order to be competitive in a global economy. Creating help and support mechanisms for innovation has also been approved. And, finally, within this framework, unique innovation projects have been initiated that will have a strong impact on manufacturing processes and on the companies' international competitiveness.



SECTION B.5. Scientific Outreach

Strategic area	Improving Science and Knowledge Transfer
Programme	Scientific Outreach
Objectives	<p>Objective: Raising the profile of CEI-MAR's scientific research among academics and researchers nationally and internationally.</p> <p>One of CEI-MAR's main objectives is to promote the dissemination of their research results to the scientific community.</p> <p>To achieve this objective, the 2011 CEI-MAR REPORT set out the following programme: Creativity Campus: CEI-MAR Scientific Dissemination</p> <p>This programme is intimately connected to the C.2. Inter-relationship between CEI-MAR and Society, as part of Campus Transformation. Programmes considered here (B.5.) address activities focused on scientific and academic areas (conferences of excellence, CEI-MAR monographs, advanced scientific exhibitions, international repercussion of CEI-MAR science, D-fusion programme to disseminate news related to research internationally), while the majority of activities focused on scientific dissemination to society are described in section C.2.</p> <p>Thus, this objective can be broken down into:</p> <ul style="list-style-type: none"> ▶ Programme of CEI-MAR conferences of excellence. ▶ Publication and Editing of CEI-MAR monographs of excellence. ▶ Scientific dissemination by publishing high-impact scientific and social articles ▶ Supporting international scientific conferences. ▶ Scientific exhibitions of excellence. ▶ Disseminating science internationally through the D-fusion programme ▶ Scientific dissemination project aimed at encouraging new scientific vocations (CEI-MAR summer courses should be highlighted).



B.5. SCIENTIFIC OUTREACH

INITIAL OBJECTIVES FROM THE 2011 PROPOSAL

The objective proposed in 2011 was: Reinforce the partnership's overall capacity to disseminate research results to society through creative interaction.

This objective has evolved through developing objectives previously considered. Creating, put-

ting into action and consolidating Scientific Culture and innovation Units (UCC+i) is described in section C.2. These have acted as catalysts for all scientific dissemination efforts aimed at various audiences (schools, students, citizens), informing society about the CEI-MAR Campus. This section features activities designed to raise the scientific and academic profile.



DESCRIPTION OF WORK ACCOMPLISHED

At the start of the CEI-MAR International Campus of Excellence Programme (2011), central government passed Law 14/2011 of 1 June, of Science, Technology and Innovation establishing one of the objectives as "Enhance scientific, technological and innovative culture through education, training and dissemination in all sectors and in society as a whole" (Art.2.) This objective is developed most notably in Article 38 "Scientific and technological culture". Thus, the Spanish System of Science, Technology and Innovation stakeholders should "foster scientific communication and include scientific, technological and innovation culture as the intersecting axis in the education system".

The scientific component of the outreach, centred in disseminating the results of scientific projects and research contracts, is more in keeping with this strategic area "Improving Science and Knowledge Transfer". The more social component, scientific dissemination in schools, volunteering activities, the general public etc., is more in keeping with the strategic area "Campus Transformation CEI-MAR –Society" (Section C.2.) and CEI-MAR Sustainability Programme" (Section C.6). Programmes from both these strategic areas have a common objective: to disseminate information and promote the CEI-MAR Campus in society. Therefore, this section focuses on describing the Campus' scientific dissemination activities from a scientific-academic perspective.

1.- Programme of CEI-MAR conferences of excellence.

In 2012 the CEI-MAR programme of Conferences of Excellence began. These were delivered in its first two years (2012 and 2013) by international researchers and research area specialists. In the last two years, this has also included conferences related to the business world aimed at looking more closely at innovation. They were given the name Business Innovation Conferences of Excellence and are featured in section B.3.

These conferences are held in teaching rooms with advanced teleconference facilities and are relayed in real time over the internet. The conferences are subsequently edited and made available to the university community, which can watch them at any time through the SEA-PILLS video library. They can now also be watched in their new location on the CEI-MAR Youtube channel (see Section C.5.) (<http://goo.gl/EegrDc>).

The campus has held almost 70 conferences of excellence so far which span the fields of Humanities, Basic Sciences and Engineering. Most of these conferences are streamed to the rest of the CEI-MAR members and many of them have recordings available on the campus website (<http://goo.gl/LGcMrl>).

Two thirds of the speakers at these conferences came from overseas, representing 18 countries. The partnership has attracted well known conference speakers such as Daniel Pauly, Robert



CEI-MAR conferences of excellence have included prestigious scientists such as Daniel Pauly and Robert Chen who also participated in a dissemination activity with schools



Chen, Carlos Duarte, Sergio Sañudo, Craig Bishop and Larry Pratt. Here is a list of organised conferences, starting with the most recent:

Cipollini, Paolo. July 2016. "Advances in Satellite Altimetry for Coastal Oceanography". National Oceanography Center. Southampton (UK).

Malaquías, Manuel A. May 2016. "On the origin of the species in the Oceans: a tale from shallow and deep see gastropods" University of Bergen (Norway)

Flik, Gert. May 2016. "Stress physiology of fish from zebrafish to carp, seabream, seabass and salmon" Nijmegen University (Holland).

Silva Casarín, Rodolfo. April 2016. "A global vision of the present and future of low-lying coastal areas in light of climate change" National Autonomous University of Mexico.

Mesas Carrasposa, Javier. April 2016. "RPAS in Cartographic Engineering". University of Cordoba.

García Gómez., Jose Carlos. April 2016. "The Guadalquivir estuary: Science, Society and Management" University of Seville.

Neves, M^a Graça. April 2016. "Wave energy plants and other mechanisms". Universidade Nova de Lisboa.

Valverde, M^a Carmen. March 2016. "The Mayan worldview and their aquatic universes: Archeological research in cenotes" Autonomous University of Mexico.

Bouma, Tjeerd. March 2016. "How to use ecosystems for coastal defense: toward understanding their creation & dynamics". NIOZ (Holland).

De la Fuente, Jose Ignacio. November 2015. "Ubago: Innovation and tradition in marine products production and distribution". Director of Ubago Group Mare.

Abelló, Pere. October 2015. "Observers of the Sea, a scientific tool for citizens to contribute to marine life knowledge: biodiversity and issues". The Institute of Marine Sciences ICM-CSIC. Barcelona.

Emery, WJ. September 2015. "Ice and sea surface temperatures measured with a UAV mounted calibrated infrared radiometer". University of Colorado (USA).

Novales Flamarique, Iñigo. July 2015. "Use of ultraviolet light and polarized light by fish to better detect zooplankton" Simon Fraser University (Canada).

Cabos, William. July 2015. "Importance of the South Atlantic Anticyclone for the Tropical Atlantic annual cycle". Alcalá de Henares University.

Flik, Gert. May 2015. "Balancing welfare and production in fish aquaculture, translational studies on zebrafish for aquaculture". Nijmegen University (Holland).

Ferreira, Oscar. March 2015. "RISC-KIT: Resilience-Increasing Strategies for Coasts – toolKIT". University of Algarve (Portugal).

Sofina, Ekaterina. March 2015. "Modelling of the surface and internal tides in the Barents Sea: dynamics, energetics and tidally induced diapycnal diffusion". Russian State Hydrometeorological University (Russia).

Vankevich, Roman. March 2015. "Baltic sea community model development: main ideas and challenges". Russian State Hydrometeorological University (Russia).

Chen, Robert. March 2015. "Coastal carbon cycling". University of Massachusetts, Boston (USA).

Hernández León, Santiago. November 2014. "The role of vertical migration in micronectonics in the ocean's biological pump" University of Las Palmas de Gran Canaria.



Di Filippo, Marcelo. November 2014. "Mare Nostrum to Frontex plus: New formulas for old challenges?" University of Studi di Pisa (Italy).

Ortega Rubio, Alfredo. October 2014. "Challenges to sustainable development in a coastal area of Mexico". CONACYT coordinator (Mexico).

De la Calle, Fernando. September 2014. "Marine biodiversity and biotechnology applied to human health." Pharmamar.

Pratt, L. Julio 2014. "Mysteries of American eel migration from the Sargasso sea: physics and biology". Woods Hole Oceanographic Institution.

García Lafuente, Jesús. June 2014. "How large-scale processes affect the smaller scale processes and vice versa: the example of the Strait of Gibraltar". University of Malaga.

Pauly, Daniel. June 2014. "Impact of fishing and global warming on marine ecosystems". British Columbia University (Canada).

Scherer, Marinez. June 2014. "Coastline Management: Experiences in different international contexts". Federal University of Santa Catarina (Brazil).

Flik, Gert. May 2014. "Endocrinology of stress in teleost fish." Nijmegen University (Holland)

Hermon, Elly. April 2014. "The Republic of Venice: flourishing thalassocracy and paradigmatic laboratory of society-environment interactions." Laval University (Canada).

Canals, Miquel. April 2014. "Lights in the abyss: a brief account of recent findings in our nearby seas". University of Barcelona.

Sáez, Javier. April 2014. "Strategic Importance of the strait of Gibraltar in the international traffic of containers". Director-general APM terminals.

Nieto, Xavier. April 2014. "Underwater Archaeology: from treasures to historical documents." Former director ARQUA.

Balguerías, Eduardo. April 2014. "The challenges of fishing biology: new scientific approaches to the assessment and management of the marine ecosystem". The Spanish Institute of Oceanography.

Masqué, Pere. 2014. "Applications of radioactive isotopes as tracers for processes in the oceans". Autonomous University of Barcelona.

Aznar, Eduardo. April 2014. "Regional planning and regulation of marine-related occupations. Andalusia in the Atlantic civilization origins." University of La Laguna.

Gasol, Josep. April 2014. "What Darwin could not see: microbial life in the sea". ICM-CSIC. Barcelona.

Gomís, Damiá. April 2014. "The Mediterranean of the XXI century". University of the Balearic Islands.

Niell, F. Xavier. March 2014. "The complexity of marine systems". University of Malaga.

Oguz, Temel. September 2013. "Impacts of boundary current instabilities on winter circulation and plankton production characteristics of the Catalan-Balearic Sea (Northwestern Mediterranean)" Middle East Technical University (Turkey).

Macías, Diego. September 2013. "Ecosystem simulation and scenarios for the marine and coastal environment at the Joint Research Centre of the European Commission" Joint Research Centre. European Commission. Ispra (Italy).

Betancur, Arturo. July 2013. "The colonial port of Montevideo, its naval station" University of the Republic (Uruguay).

Jumar, Fernando. July 2013. "The River Plate in the Route to the Indies" University of the Republic (Uruguay).



<p>Bishop, Craig. June 2013. "Climate model dependence and the replicate Earth paradigm". US Naval research laboratory (USA).</p>	<p>Sedrati, Mouncef. June 2012. "The South Brittany coast - France: Past, current and future state". Bretagne Sud University (France).</p>
<p>Perez Vallmitjana, Marta. June 2013. "From genetics to landscape ecology, recent research on marine phanerogams from Catalonia" University of Barcelona.</p>	<p>Ferreira, Oscar. June 2012. "Importance of outlets in the evolution of a coastal lagoon system: Examples: Ría Formosa, Algarve, Portugal" University of Algarve (Portugal).</p>
<p>Flik, Gert. May 2013. "Endocrinology of stress in teleost fish." Nijmegen University (Holland).</p>	<p>Borobio Sanchiz, Manuel. May 2012. "Coast Regional Plan (POL) of Galicia: change in the approach of regional planning" Institute of Regional Studies. Galicia Regional Government.</p>
<p>Terrados, Jorge. April 2013. "Posidonia oceanica seedlings: new research opportunities in the ecology of the species and seagrass meadow restoration" IMEDEA-CSIC.</p>	<p>Stokesbury, Michael. May 2012. "Electronic tagging of giant Atlantic bluefin tuna in the Gulf of St. Lawrence, Canada, in collaboration with the Global Ocean Tracking Network (OTN)". Acadiz University (Canada).</p>
<p>Vila-Concejo, Ana. April 2013. "Morphodynamic filling the gaps in coral reefs" University of Sydney (Australia).</p>	<p>Flik, Gert. May 2012. "Endocrinology of stress in teleost fish." Nijmegen University (Holland).</p>
<p>Mikolajewicz, Uwe. March 2013. "The future of the climate of the earth according to MPI-ESM". Max Planck Institute for Meteorology (Germany).</p>	<p>Pérez Mallaina, Paul E. May 2012. "Everyday life in the Route to the Indies vessels". University of Seville.</p>
<p>Boyer-Villemaire, Ursule. January 2013. "Perceptions, capacity to adapt and vulnerability of communities facing dangers of erosion and coastal flooding: cases of Chipiona (Andalusia), Kilkeel (Northern Ireland) and Avignon (Quebec)" Université du Québec à Rimouski (Canada).</p>	<p>Ryabchenko, Vladimir. April 2012. "Modelling the variability of the marine ecosystem in the Canary Upwelling" Russian Academy of Sciences (Russia).</p>
<p>Payo, Andrés. January 2013. "Modelling long-term evolution of coastal sedimentary systems" Oxford University (UK).</p>	<p>Rodríguez Vidal, Joaquín. April 2012. "Logging tsunami events on the coasts of the Gulf of Cadiz: Changes of scenery and human implications" University of Huelva.</p>
<p>Compatangelo-Soussignan, Rita. November 2012. "Strabo's lexicon of coastal geomorphology from Troy to the Iberian Atlantic" University of Maine (France).</p>	<p>Macreadie, Peter. March 2012. "Responses of seagrass ecosystems to disturbance: Stories from Australia" University of Technology Sydney (Australia).</p>
<p>Duarte, Carlos M. June 2012. "Malaspina Expedition: The end of the beginning" IMEDEA-CSIC (Balearic Islands).</p>	<p>Aznar, Mariano. March 2012. "Underwater Treasures: The Odyssey Matter The Galleon of Our Lady of Las Mercedes" Jaume I University Castellón.</p>
	<p>Sañudo-Wilhelmy, Sergio. February 2012. "Vitamins in marine systems: From Biochemistry and Analyti-</p>



cal Chemistry to Oceanography" University of Southern California.

This list does not include the business innovation conferences of excellence, which are listed in section B.3.

Of particular note is CEI·MAR's backing of one of the lecturers, Professor Daniel Pauly, to be nominated Doctor *Honoris Causa* by the University of Cadiz. Dr. Daniel Pauly is a very accomplished researcher who has had a great impact on developing fisheries science, providing hugely relevant contributions. His most outstanding work, summarised in the axiom "fishing down the food web", has been recognised as one of the 20 works that have had the greatest impact on Conservation Biology. Dr. Pauly's expertise fits perfectly into two of the thematic areas that define the Campus of International Excellence of the Sea (CEI·MAR), especially the areas of specialisation: "Marine Resources" and "Marine Knowledge". He has combined his impeccable research career with his personal commitment to nature conservation. This links him to a third area of CEI·MAR specialisation: "Sea Management".

The ceremony which awarded Dr Pauly as *Honoris Causa* by the University of Cadiz took place on 19 June 2014 <http://goo.gl/GlrsWp>. The following day we had the opportunity to hold a debate day which we called "CEI·MAR with Daniel Pauly", with speeches from leading researchers from different institutions belonging to CEI·MAR (see news on <http://goo.gl/BfBGv1> and video of the meeting on <http://goo.gl/FuqQo6>).

2.- Publishing the editorial collection of monographs of CEI·MAR Excellence.

Another cornerstone of CEI·MAR's scientific dissemination has been the "Collection of CEI·MAR monographs". These are scientific monographs and high quality teaching texts that help to disseminate research activity from the CEI·MAR community, for the academic world (through the Union of Spanish University Publishers, UNE)

and scientists. This activity has had great development and around twenty monographs have been published now, covering almost all areas of knowledge, from History or Marine Archaeology to Biology, Marine Ecology or Gastronomy, as detailed below (<http://bit.ly/21YuKAn>):

1. The art of fishing: Phoenician and Roman origins of Andalusian fishing techniques <http://bit.ly/2c3YfPj> gear.
2. Marine Flora of the Cadiz coast: Biology, Ecology, uses and identification guide <http://bit.ly/2czgjUy>.
3. From fishing to Garum: the exploitation of marine resources in Pompeii and Herculaneum <http://bit.ly/2bLBPqj>.
4. Ebusus and Pompeii, maritime cities. Monetary testimonies of a relationship <http://bit.ly/2c5Xffv>.
5. The sea in History and Culture <http://bit.ly/2ck3p87>.
6. Underwater Spanish Archaeology <http://bit.ly/2c5Xwzn>.
7. Atlas of aquatic fauna of the Bay of Cadiz saltworks <http://bit.ly/2c3skz5>.
8. Requirements for obtaining the quality mark "lenguado de crianza". Processes of self-control during the production phase (pre-fattening and fattening).
9. Fish in the Iberian Peninsula: keys for their identification.
10. Molluscs and purple in Atlantic/Mediterranean archaeological contexts <http://bit.ly/2bVtDOU>.
11. Fattening of clams in the province of Huelva.
12. Salt Experts <http://bit.ly/2cps9MA>.
13. Book of Biology practices.
14. Histophysiological Atlas of the Toadfish <http://goo.gl/91L8nX>.
15. Natural Park of the Strait: border between



Book launch for "¿Las algas se comen? (Can you eat seaweed?) edited by CEI-MAR and coordinated by Campus professors and Ángel León (otherwise known as 'Chef of the Sea'). The book includes innovative recipes from 16 Spanish chefs who have 50 Michelin Stars between them

two worlds <http://goo.gl/aUSwtw>.

16. Can you eat algae?: a voyage through Biology, History, curiosities and Gastronomy <http://bit.ly/2ck4r3X>.

17. The Blue Economy <http://bit.ly/2c5WGml>.

18. Fishing Heritage.

19. Paleontology and the La Florida archaeology site.

Work is also taking place on a final monograph to bring together the first five years of the CEI-MAR project. It will be the twentieth monograph published and will summarise the achievements of the campus project, acting as an institutional book.

These monographs are adapted to the quality standards of Spanish publishers, through blind peer assessment and rigorous editorial checks that allow them to have the stamp of the UNE (Union of Spanish University Publishers), which guarantees they will be distributed and marketed nationally and internationally. They are adapted to the standards required by the National Research Assessment Commission of the Ministry of Education, Culture and Sport for some assessment areas - such as History, Geography and the Arts, among others- ([Http://www.mecd.gob.es/ministerio-mecd/organizacion/organismos/cneai.html](http://www.mecd.gob.es/ministerio-mecd/organizacion/organismos/cneai.html)), so they are indexed publications which have made an impact. The notable success of this collection means that work is under way to consolidate it

in the future as a set Editorial Collection on marine-maritime themes in Andalusia and its geographic reference area.

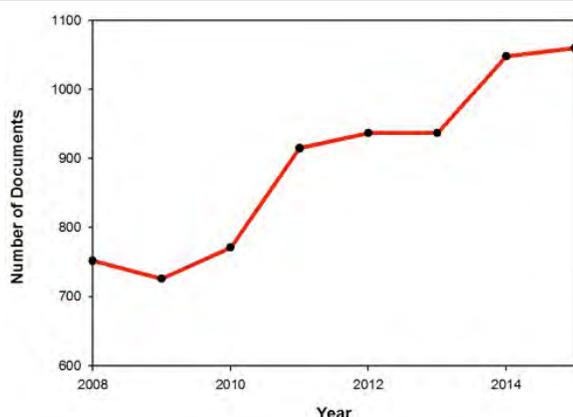
Furthermore, some of these monographs have made a clear social impact by making scientific knowledge relevant to issues closer to citizens' interests such as the topic of Garum, (*From Fishing to Garum: Marine resources exploitation in Pompeii and Heraklion*) the saltworks (*Salt Experts*), or marine products gastronomy (*Can you eat algae?: a voyage through biology, curiosities and gastronomy*).

In addition, CEI-MAR has collaborated in volumes outside the collection:

- ▶ Archaeological Map of Northern Morocco.
- ▶ Animapiratas and the 'A Manos Llenas' storytelling app. Stories about the sea for children with visual and hearing disabilities.

3. Scientific dissemination through publishing high-impact scientific and social articles.

One of the first outcomes of research is that it is shared with the wider community through scientific publications. Since CEI-MAR has been active, scientific output has been steadily increasing in topics related to the Campus. Before the Campus existed, less than 800 articles were published annually, yet in the last year, more than 1000 articles were published. Overall, in



CEI-MAR has significantly increased its scientific production. In the five year period of 2011-16, they published more than 5000 articles in influential journals

the five year period of 2005-2010, the partnership's members published a total of 3850 publications while in the five year period of 2011-2016 with the Campus' input, it reached 5213 (35% more, taking into account that 2016 has not finished yet).

Whilst an analysis of the partnership's research activity was discussed in section B.2., the following section will reference a selection of 10 CEI-MAR articles which have been published in prestigious international journals and have made a noticeable impression as well as having a significant scientific, and in some cases social and media, impact.

Cózar, A., F. Echevarría, J.I. González Gordillo, X Irigoien, B. Ubeda, S Hernández-León, A.T. Palma, S. Navarro, J García de Lomas, A Ruiz ML Fernandes de Puelles y CM Duarte (2014). Plastic debris in the open ocean. *Proceedings of the National Academy of Sciences*, 111 (no. 28), 10239-10244. (DOI: 10.1073/pnas.1314705111).

Serrano Catalá, T., I. Reche, A. Fuentes-Lema, C. Romero-Castillo, M. Nieto-Cid, E. Ortega-Retuerta, E. Calvo, M. Alvarez, C. Marrasé, C.A. Stedmon & X.A. Alvarez Salgado. 2015. Turnover time of fluorescent dissolved organic matter in the dark global ocean. *Nature communications*, art. No. 5986. (<http://go.nature.com/2cvfQiL>).

Huertas, I.E., AF Ríos, J Garcia Lafuente, G Navarro, A Makaoui, A Sánchez Román, S Rodríguez Galvez, A Orbi, J Ruiz & FF Pérez. 2012. Atlantic forcing of the mediterranean oligotrophy. *Global Biogeochemical cycles*. Vol 26. (DOI: 10.1029/2011GB004167).

Ramos, J., S. Domínguez Bella, JJ Cantillo, M Sorriquer, M Pérez, J Hernando, E Vijande, C Zabala, I Clemente & D Bernal. 2011. Marine resources exploitation by Palaeolithic hunter-fisher-gatherers and Neolithic tribal societies in the historical region of the Strait of Gibraltar. *Quaternary international* 239 (1-2): 104-113. (<http://dx.doi.org/10.1016/j.quaint.2011.03.015>).

Moreno-Marín, F., JJ Vergara, JL Pérez-Llorens, MF Pedersen & FG Brun. 2016. Interaction between Ammonium Toxicity and Green Tide Development Over Seagrass Meadows: A Laboratory Study. *Plos One* 11(4). (<http://dx.doi.org/10.1371/journal.pone.0152971>).

Cózar, A., M Sanz-Martin, E Martí, JI González-Gordillo, B Úbeda, JA Gálvez, X Irigoien & CM Duarte. 2015. Plastic accumulation in the Mediterranean Sea. *Plos One* 10(4). (<http://dx.doi.org/10.1371/journal.pone.0121762>).

Tovar-Sánchez, A., D. Sánchez-Quiles, G. Basterretxea, Juan L. Benedé, A. Chisvert, A. Salvador, I. Moreno Garrido & J. Blasco. 2013. Sunscreen Products as Emerging Pollutants to Coastal Waters. *Plos One* 8(6). (<http://dx.doi.org/10.1371/journal.pone.0065451>).

Ruiz, J., D. Macías, MM Rincón, A Pascual, IA Catalán & G Navarro. 2013. Recruiting at the Edge: Kinetic Energy Inhibits Anchovy Populations in the Western Mediterranean. *Plos One* 8(2) (<http://dx.doi.org/10.1371/journal.pone.0055523>).

García Robledo, E, A Corzo, S Pappaspyrou. 2014. A fast and direct spectrophotometric method for the se-



quential determination of nitrate and nitrite at low concentrations in small volumes. *Marine chemistry* 162: 30-36. (<http://dx.doi.org/10.1016/j.mar-chem.2014.03.002>).

Del Río, L., TA Plomaritis, J Benavente, M Valladares & P Ribera. 2012. Establishing storm thresholds for the Spanish Gulf of Cadiz coast. *Geomorphology* 143: 13-23. (<http://dx.doi.org/10.1016/j.geomorph.2011.04.048>).

We want to highlight, as an example, Cózar et al (2014), whose article on the distribution of microplastics in the world's oceans stands out due to the influence it has had. It was published in the PNAS Journal (Proceedings of the National Academy of Science USA) and has exerted huge influence in the international scientific media. It features a global map and a leading estimate of the extent of pollution caused by plastic in the oceans, whose effects on marine organisms are still unknown but clearly worrying. This article was the cover story for the journal and was highlighted in Nature and Science. It has been downloaded more than 75,000 times from the online journal. *Essential Science Indicators - Thomson Reuters*, based on the number of citations it has received, classifies the paper as a "hot paper", meaning that it features in the top 0.1% of papers from its field of research (it is currently cited in 185 papers according to Google Academic 5/09/2016). Regarding the media, the *Altmetric Score* specifies that the article is in the 99th percentile of a sample of 133,388 articles from all scientific journals published around the same time, and it is in the 99th percentile (in fifth place) of 902 articles published around the same time in PNAS. This paper has been shared in the main national and international media outlets, including more than a hundred reports in international written press, radio and television. For example, NBC, CBS news, La 2, RNE, La Republica, Le Figaro, Forbes, The Guardian, Le Monde, National Geographic, Al Jazeera, Washington Post, and New York Times (e.g. <https://pnas.altmetric.com/details/2476764/news>). It has also been used as a reference for the recent production of

various feature-length documentaries produced by ARTE TV, Robert Redford Productions, Discovery Networks and the prestigious BBC Earth.

4. Supporting Conference organising

CEI-MAR has supported international conferences and first-class workshops as a way of disseminating scientific research and raising its international profile. Even though they are already listed in section B.2., this section will highlight some of them because of their relevance: The *Association for the Sciences of Limnology and Oceanography* (ASLO) conference in Granada (2015), (Link to the news bulletin: <http://goo.gl/YdfcHr>), *Marine Sciences* conferences in Cadiz (2012), (Link to the news bulletin: <http://goo.gl/kamuBS>), the national conference of aquaculture in Huelva (2015), and the *Anforas* conference in Cadiz (2015) (Link to the news bulletin: <http://goo.gl/CHQy8n>). By way of example, the first of these -ASLO2015-, one of the most reputable conferences in marine sciences worldwide which tours various countries, welcomed 2500 experts from 64 countries. **CEI-MAR** played an important role as co-organiser, with members from the UGR, UMA, UCA, ICMAN-CSIC and IEO on the organising committee. It also had a specific stand where it disseminated information to the international marine science community on the strengths of the partnership.

5. Exhibitions relevant to scientific dissemination.

Over these last few years, various scientific exhibitions focused on marine themes have been enhanced. Some of them are more educational in nature whilst others are focused on disseminating information about research projects related to marine themes. (The more informative and educational exhibitions feature in section C.2.).

Some have been coordinated by different institutions due to their depth and importance, touring and visiting various centres affiliated with **CEI-MAR**. The most notable one to highlight is the *Malaspina Project* Exhibition organised by CSIC



CEI-MAR has organised and participated in several national and international conferences including the ASLO conferences, Acuicultura ibérica (Iberian Aquaculture) and Anforología Romana (Roman Amphora), held at the universities of Granada, Huelva and Cadiz respectively.

and promoted by CEI-MAR. The circumnavigation expedition was exhibited under the same name and financed by the Ministry of Science and Innovation as part of the Consolider-Ingenio 2010 programme. It is the first touring exhibition that has visited the headquarters of CEI-MAR's 5 Andalusian Universities. The exhibition started in the University of Malaga, which has acted as CEI-MAR's promoter of this initiative. After this, the exhibition went to the convention centre in Granada as part of the ASLO conference. Following this, it was exhibited at the Faculty of Science at the University of Granada. In Cadiz, it was exhibited at the Santa Catalina Castle, in collaboration with the City Council, and from there, it moved to Huelva where it was exhibited in the Faculty of Experimental Sciences at the University of Huelva. Finally, it was exhibited at the Faculty of Science at the University of Almeria <http://goo.gl/UH3rv1>.

For the exhibition at the Santa Catalina Castle of Cadiz, CEI-MAR institutions such as the ROA or the IHM lent some valuable pieces to the exhibition (<http://bit.ly/2coPW3h>; <http://bit.ly/2cHTg5N>).

This exhibition, visited by more than 60 000 people (<http://bit.ly/2cJvI93>), included guided visits from schools and the general public as well as a programme of visits to the Sarmiento de Gamboa Oceanographic Research Vessel during its opening day at the port of Cadiz.

This exhibition has been accompanied by a series of conferences of excellence (added to those

from section 1) in each of the partner universities that it has visited. Both researchers from CEI-MAR and those from other institutions, mainly participants in the Malaspina project, have delivered these conferences. From among them, we can highlight:

- ▶ Fidel Echevarría (UCA-CEI-MAR). The Malaspina Expedition and Oceanography in the XXI century.
- ▶ Josep Gasol (ICM-CSIC). What Darwin could not see: microbes and genes from the ocean.
- ▶ Isabel Reche (UGR-CEI-MAR). Fluorescence in darkness: organic matter.
- ▶ Enrique Moreno Ostos (UMA-CEI-MAR). Why is it important to study the variation of phytoplankton size in the ocean?
- ▶ Antonio Bode (IEO-Coruña). Isotopes diet in the ocean's trophic network.
- ▶ Andrés Cózar (UCA-CEI-MAR). The oceans: storage for plastic waste.
- ▶ C. M. Duarte (IMEDEA-Mallorca). Malaspina expedition: Seafaring on a new quest.
- ▶ Isabel Reche (UGR-CEI-MAR). Organic matter from the dark ocean: the microbial pump.
- ▶ Santiago Hernández León (ULPGC). The role of vertical migration of micronecton in the ocean's biological pump.



The exhibition, *Un mar de datos (A sea of data)*, as part of the Malaspina Expedition, has toured all CEI-MAR universities in Andalusia. On the left, the opening ceremony at the UMA Rectorate. On the right, the opening session at the Castle of Santa Catalina in Cadiz

- ▶ Rafel Simó (ICM-CSIC). The breath of the sea: a global vision without losing details.
- ▶ Fidel Echevarría (UCA-CEI-MAR). The Malaspina 2010 project and the campus of international excellence of the sea CEI-MAR.
- ▶ Juan Antonio Aguilar (IHM-CEI-MAR). The contribution of the Spanish Navy to the Malaspina expedition 2010.
- ▶ Andrés Cózar (UCA-CEI-MAR). Plastic in seas and oceans: a solvable global threat.
- ▶ Francisco José González (ROA-CEI-MAR). Five centuries circumnavigating the planet.
- ▶ Miquel Alcaraz (ICM-CSIC). Old wine in new wineskins: Science and art in the 2010 Malaspina oceanography expedition.
- ▶ Josep Lluís Pelegrí (ICM-CSIC). The Earth's circulation system.

6.- “D-Fusion” Programme, aimed at sharing scientific research from the Campus more widely and internationally.

This programme aims to increase the number of press releases on research and knowledge transfer to inform the wider community on research progress, projects, relevant contracts, patents and other outcomes that are a result of scientific activities on the CEI-MAR Campus. Furthermore, press releases are shared

internationally through worldwide scientific outreach networks by subscribing to the Alphasileo (USA) and EUREKALERT (Europe) networks. A summary of press releases generated on CEI-MAR can be found on the campus website (<http://bit.ly/2cb43Wf>).

7. Summer Science Campus (FECyT). Kindling vocations.

As part of the call to 'Strengthen information sharing activities' by the Spanish Foundation of Science and Technology (FECyT), three projects have been secured over these last 3 years (see section C.2.). In addition to these projects, the procurement of the organisation of the Summer Science Campus last year was a huge success especially if it is taken into account that it was the first time that CEI-MAR was allowed to participate in this tender. Only Campuses of Excellence were allowed to bid and only fifteen were selected.

The CEI-MAR 2016 summer science campus was attended by 120 students over the 4 weeks of July. 4 workshops were designed closely linked to marine knowledge and outstanding CEI-MAR facilities. The public presentation of this summer science campus was held on 29 June, where they made the planning and all details known. All information related to these workshops can be found on these websites: <http://goo.gl/hR8yqs> y <http://goo.gl/cnU2F2>.



120 Secondary and Sixth Form students from all over Spain, selected by FECyT, participated in the 4 CEI-MAR Scientific Summer Campus workshops.



- ▶ Workshop 1: Marine biodiversity of our coasts. This activity was carried out in the Marine Research Laboratory Facilities (LA-BIMAR).
- ▶ Workshop 2: Aquaculture and its environment. Held in the Marine Crops Facility at the Andalusian Centre for Marine Studies (CASEM).
- ▶ Workshop 3. Know the saltworks: from the macro to the micro. Activity carried out in facilities at the La Esperanza saltworks.
- ▶ Workshop 4. Introduction to oceanography research. Workshop including an oceanographic information campaign on board the UCADIZ vessel.

In future editions of the "Summer Science Campus" programme we intend to offer to organise these workshops at other universities and the partnership's PRIs.



ROLE OF THE PARTICIPANTS

As has been set out in the section: 'Description of Work Accomplished', the task, which focused on sharing scientific knowledge, was coordinated together with the other members, creating complementary activities that toured the length and breadth of the CEI-MAR region **such as the conferences of excellence or the scientific exhibitions**

like Malaspina. Several members jointly participated in organising recognised conferences such as ASLO2015 in Granada. Likewise, collaboration in scientific publications between CEI-MAR members has increased in the form of co-authoring articles.



MOST SIGNIFICANT RESULTS

- ▶ Scheduling and running 70 CEI-MAR conferences of excellence with the participation of national and international leading specialists in marine research and innovation.
- ▶ Editing and publishing 20 CEI-MAR monographs of excellence.
- ▶ Significant increase in quality and number (35%) of articles published.
- ▶ Support and participation in organising international conferences.
- ▶ Scientific touring exhibitions such as Malaspina co-organised by all the Spanish partner universities.
- ▶ D-Fusion Programme, gathering and disseminating research outcomes from the CEI-MAR groups.
- ▶ Success in FECYT tender, organisation and running of Summer Science Campus with the aim of kindling scientific vocations.



SECTION B.6. University - Business - Society Connection Programme

Strategic area	Scientific and Knowledge Transfer Improvement
Programme	Programme to foster University-Business-Society initiatives
Objectives	<p>Objective: Develop and promote an entrepreneurial spirit and capacity as a means of generating wealth and employment.</p> <p>Fostering an entrepreneurial spirit is a fundamental objective in all economic growth and employment policies. In this sense, developing entrepreneurial capacity requires a set of strategies, initiatives and measures that cultivate entrepreneurial concerns among the population as a whole. It also requires adequate training in business creation and innovation culture, as a means of generating wealth and employment.</p> <p>In order to achieve this objective, the following programmes are proposed:</p> <ul style="list-style-type: none"> ▶ Plan to cultivate and develop entrepreneurial culture. ▶ Create awareness around marine-related opportunities. ▶ Create the <i>Business Angels</i> marine network. Encourage the creation of a maritime entrepreneurial ecosystem. ▶ Train entrepreneurs. ▶ Encourage the evolution of <i>Spin-offs</i> and <i>Start-Ups</i>.



INITIAL OBJECTIVES FROM THE 2011 PROPOSAL

The initial objectives are the same as in the previous section, although we have expanded the second by adding the creation of a maritime entrepreneurial ecosystem.

DESCRIPTION OF WORK ACCOMPLISHED

In the current socio-economic context, creating innovative and competitive companies is very important for regional economic development. The public education and research institutions should provide their students and researchers with necessary training to transfer their knowledge to new competitive companies. There are a few powerful predecessors from individual CEI-MAR institutions (units to boost entrepreneurs-

hip, training and support programmes, etc.) and bringing this knowledge together has enabled us to determine specific marine-maritime strategies and programmes for the partnership as a whole. To this end, the Inter-institutional Committee for Knowledge Transfer has boosted the actions outlined in the first paragraph of this section, drawing on resources from each institution, as well as those provided by the CEI-MAR Foundation, but under one programme, one common goal and under one CEI-MAR coordination.

1. Cultivate and develop entrepreneurial culture.

To promote and support the creation of technology-based companies and knowledge-based companies in general, we have launched a series of marine-maritime programmes and initiatives that we will comment on now.

Due to its commitment to help cultivate entrepreneurial capacity among students, graduates



and researchers, in 2012, CEI-MAR launched the **plan to cultivate and develop entrepreneurial culture and generate knowledge-based marine-maritime companies, aTrÉBT!® CEI-MAR**, led by the partnership as a whole. The prize-giving session is the key element of the programme which identifies Blue Economy entrepreneurs, ideas and projects which are subsequently given support so that these ideas and projects become real businesses.

This plan has three stages. The first is to disseminate the entrepreneurial culture and announce the awards, which will be given out in the next stage.

Secondly, the award-giving ceremony for ideas in both their idea phase and their project phase. The first is dedicated to promoting the emergence of innovative ideas and subsequently supporting them through a specific entrepreneurial training programme exclusively for the participants. The second phase is intended to support business creation projects that already have a certain level of maturity. These are individually supported. Each one of the phases includes several prizes and honorary mentions ([link to news and https://goo.gl/hbCT7g](https://goo.gl/hbCT7g) <http://goo.gl/nFr0i3>).

The third stage is made up of specific training and technical support that all candidates receive to mature their initiatives and make them a reality.

In the different editions, hundreds of proposals were received for the two categories: *business idea* and *business project*, encouraging dozens

of new *Start ups* . The ideas and projects are analysed by an *ad hoc* panel made up of representatives from CEI-MAR institutions as well as business associations, entrepreneurial support centres and experts in external entrepreneurship. Each proposal is analysed by the external experts who issue a report on it and form a shortlist of proposals. Those shortlisted go on to submit their proposal in a public event and the panel chooses the winners.

We have also sought to implement joint initiatives together with other institutions from the marine-maritime sector to collaborate in disseminating and evolving entrepreneurial culture in the Blue Economy.

2. Creating awareness around marine-related opportunities.

This aims to connect entrepreneurial potential with marine-related business opportunities. Business opportunities associated generally with marine sectors, were identified in the work accomplished by CEI-MAR regarding Blue Economy innovation, described in section B.4.

Furthermore, activities developed in the process of enhancing the inter-relationship between Science, Technology and Business, described in section B.3., have collaborated, sometimes directly and other times indirectly, in creating an awareness of the business potential in marine resources. By way of example, among the most significant results of section B.3. we have cited



CEI-MAR has boosted the entrepreneurial culture in the marine-maritime sectors in order to strengthen the small and medium sized company sector. One example to highlight is the CEI-MAR ATrÉBT award contest



the project "Identification of technological and innovation opportunities for the reindustrialisation of the Bay of Cadiz". This project, as already pointed out in that section, enabled the creation of a catalogue of business initiative opportunities (entrepreneurial areas) based on the exploitation of endogenous resources from the region where the study took place. The same can be said of other projects mentioned, for example "VALORA", which identifies a business opportunity in using appropriate technologies to recover by-products from fish processing or the opportunities created for new business areas in the auxiliary industry and the creation of new companies around the process of robotised welding on the construction of vessels, or the opportunities arising from the development of new technologies to manufacture pharmaceutical, nutritional and cosmetic products from living marine resources, etc. Other business opportunities come from the ideas and projects competition, etc.

All this information which is continually accumulating, year after year, is brought together by the Inter-institutional Committee for Knowledge Transfer and shared in the Blue Economy study days and seminars, as well as in the marine entrepreneurial training programmes and through personal contact with entrepreneurs.

Among the specific events on marine-maritime opportunities, we should mention the **TRANSEBT Forum** (*Entrepreneurship resulting from Innovation and Knowledge Transfer*), a transnational event held at the University of Huelva that was attended by more than 200 participants including students, entrepreneurs, business owners, scientists, teachers, researchers and managers. The **CEI-MAR Foundation** conducted the workshop "Sea, Tourism and Logistics". The **TRANSEBT Forum** came into being as the culmination of the Operational Programme of Cross-Border Cooperation SPAIN-PORTUGAL (POC-TEP), a project which had the same objective. The programme focuses on the creation of technology-based firms (EBT) which

were birthed from technology transfer and cross-border cooperation between entities located in Andalusia or the Algarve. As members of this project, the University of Huelva, Andalucía Emprende, the Andalusian Public **Foundation** through the Huelva CADE and the Scientific and Technological Park of Huelva (PCTH), together with the collaboration of the Portuguese partners, Faro City Council, the University of the Algarve and **CEI-MAR** organised meetings on 14 May and 12 June between companies, entrepreneurs, research groups, students and research centres, interested in entrepreneurship, innovation and transferring knowledge to the productive sector. **CEI-MAR's** institutions were represented in the forum by the President of the Inter-institutional Committee for Knowledge Transfer and the manager of the **CEI-MAR Foundation**. (Link: <http://goo.gl/Fhj9q7>).

3. Creation of *Business Angels* marine network. Encourage the creation of a maritime entrepreneurial ecosystem.

To this end, an agreement with the Official College of Marine and Ocean Engineers of Spain (COIN) has been set up to encourage the creation of a **maritime entrepreneurship ecosystem**. It is linked to the *Blue Growth* policy and the opportunities for the maritime sector that



The CEI-MAR Foundation manager at the University of Huelva for the cross-border innovation and knowledge transfer meeting, TRANSEBT.



appear in large areas of this Blue Economy, especially in emergent sectors such as Cruise Ship Tourism, *Off Shore* Wind Energies, Marine Surveillance and Monitoring and Aquatic Sea Products. There are also other sectors with opportunities that show huge potential, even though they are only in their early stages, such as Marine Current Renewable Energy or Blue Biotechnology. Along with this, both the directives for the new European Industrial Policy and the new Spanish Industrial Agenda, provide favourable conditions. (Link to news bulletin: [Http://goo.gl/m4TPdt](http://goo.gl/m4TPdt)).

An agreement, which has started to be outworked, from various perspectives, including the training perspective, which we will refer to in the following sub-section.

CEI-MAR together with COIN have undertaken the task of creating a top-down entrepreneurship ecosystem in the European maritime sector which enables them to attract capital and talent to encourage the creation of new projects which will disrupt normal formalised innovation strategies such as Start Ups with the following specific objectives:

- ▶ Promote the creation and evolution of innovative enterprises in their seed capital phase through the COIN *Business Angels* "Blue Ocean" (network <http://bit.ly/2csY-Z10>), which would provide smart capital, i.e., finance, network of contacts and experience, to these companies through information service provision, dissemination, intermediation, project analysis and others which prove necessary to facilitate the provision of financial resources to innovative business projects.
- ▶ Attract private capital from maritime companies that most represent their value chain and who, apart from their own interest in the financial return, would find an instrument to promote their strategic development and innovation strategies in an environment of greater dynamism and growth.



Signing the agreement between CEI-MAR and the Official College of Marine Engineers to launch a maritime entrepreneurial ecosystem

- ▶ Offer non-maritime investors the opportunity to diversify their investment activities in *Start Ups*, capitalizing on the sector, which by its very nature is international and has an economic impact worth millions of euros (investible).

At the same time, the **CEIMARNET** Campus of Excellence marine network is working on a joint project involving all four partner campuses of excellence (Campus do Mar, Tricontinental Atlantic Campus, Campus Mare Nostrum and **CEI-MAR**). The project is going to apply for funding from the Fundación Biodiversidad imminently under the name " **EMPLEAMAR** " (expected in September or October 2016). The **EMPLEAMAR** project acts as a National Network of Marine Entrepreneurship with the overall objective of contributing to improving the quality of life for coastal towns through the sustainable use of marine resources. The specific objectives of the project include:

- ▶ Promoting a culture of marine entrepreneurship nationally regarding the use of resources based on principles of environmental sustainability, cost-effectiveness, technical feasibility and social commitment.
- ▶ Implementation of productive activities and services related to marine resources, with a high impact on local sustainable development through technical, scientific and business support.



- ▶ Creatina spaces for national collaboration among business initiatives that are sustainable over time.

EMPLEAMAR will have two fundamental areas of action:

- ▶ Local. Each of the target areas will benefit directly, coordinated by the CEI which corresponds to the **EMPLEAMAR** programme.
- ▶ National Network. Collaboration between each of the local / regional **EMPLEAMAR** programmes is the key to the proposed program. Networking is the fundamental value of the **EMPLEAMAR** programme - so the programme's coordination will have a fundamental role in ensuring that the network is enhanced, promoting local work - coordinated by each CEI - from a collaborative working perspective.

This networking will:

- ▶ Make a more specialised scientific supply available. Increase the capacity of scientific advice as specialists in the different CEIs will be able to advise initiatives from geographical areas different to their own.
- ▶ Promote the exchange of good practice among the CEIs with regards to implementing the project.
- ▶ Promote the exchange of good practice among those who promote similar or complementary initiatives
- ▶ Provide opportunities for business collaboration among complementary initiatives that might arise.
- ▶ Incorporate motivation elements that are essential to promoters that will be part of a marine-related business development network, which they could benefit from technically and socially during the duration of the programme and on its completion.
- ▶ Design and transfer methodologies appropriate to the target audience.

An international project has been designed for the European Atlantic Programme 2017. To this end, an international consortium has been formed, made up of **CEI·MAR** universities located in the region of the Atlantic Action Plan (*University of Cadiz, University of Huelva and University of the Algarve*), *University of Vigo (Campus do Mar)*, **MARITIME JOBS** - coordinator of the "Blue Ocean" Business Angels Network -, Innovation Agency of Andalusia (IDEA), Innovation Agency of Galicia, COIN and *Bangor University*, to promote an innovative business spirit in the European maritime sector. This Consortium, has proposed a *Workshop*, which has been approved for the *3rd Atlantic Stakeholder Conference "Promoting Entrepreneurship and innovation in the Atlantic Area"*, to be held on 27 September in Dublin.

4. Train entrepreneurs.

This started with various university institutions from the Campus offering specific extra-curricular programmes on entrepreneurship, including specific modules on entrepreneurship in the marine-maritime field, particularly regarding opportunities for innovation in this area. Specific modules have also been incorporated into different masters programmes, especially in masters specialising in the marine sector. The coordinators of these masters, with the support of the units responsible for entrepreneurship in each university, the Inter-institutional Committee for Knowledge Transfer and the **CEI·MAR Foundation** have designed the training module *Creating innovative companies and projects* in the marine-maritime field which was offered for the first time in 2013/2014.

Irrespective of that already mentioned, we also have our own internal entrepreneurship training linked to the innovative marine-maritime ideas and projects competition **atrÉBT!® CEI·MAR**. In addition, through the agreement with COIN to encourage the creation and evolution of companies in the maritime sector, entrepreneurial training courses have been set up (blended lear-



ning), so that although it requires some hours of attendance in local forums, the majority of the training material in the course is done online.

Furthermore, customised training on knowledge-based *spin-offs* and *start ups* is directed towards members (researchers, students and graduates) and is delivered by the panel of specialists from the partnership, through personal and specific support.

Programmes to enhance, support and train entrepreneurs are essential to encourage the entrepreneurial spirit among researchers, university students and graduates. Special mention should go to university researchers who foster, support and provide training for entrepreneurship because their research stimulates the creation of knowledge-based companies, such as *Spin Offs*.

5. Encourage the evolution of *Spin-offs* and *Start-Ups*.

Past actions have helped identify ideas, encourage them and finally support them until they turn into knowledge-based companies in the marine sector of the economy. In this way, **CEI-MAR** has supported the creation of 17 new *Spin Offs*, which represents a 567% increase in under five years. These are incredible results for programmes which have had the critical input and support of **CEI-MAR**. It is worth stating, for example, that several of these companies received help linked to **atrÉBT!® CEI-MAR**.

These companies are of particular interest due to their direct and permanent link to the universities and in this way they become the perfect vehicle for research transfer and collaborative projects with the academic world. It works both ways (the company requests the participation of research centres and vice versa). The companies (linked to the Universities of Almeria -UAL-, the Algarve -UALg-, Cadiz -UCA-, Huelva -UHU- and Malaga -UMA-, and the Spanish National Research Council -CSIC-) are:

- ▶ **Aqualgae.** *Spin Off* from the University of Almeria, whose main activity is offering integral solutions to the field of microalgae, from setting up and running equipment (photobioreactors or *race-way* reactors), to supplying inocula, mass media, consultancy etc.
- ▶ **EISMETHODS, S.L.** *Spin Off* from the University of Huelva, whose main activity is Consultancy and Social Research.
- ▶ **Aquatic BioTechnology.** *Spin Off* from the University of Cadiz, whose main activity is: analysing benthic, zooplankton and phytoplankton samples; developing oceanography equipment and laboratory apparatus; technical assistance in oceanography and biological sampling; and aquaculture.
- ▶ **Caviar Portugal.** *Spin Off* from the University of the Algarve, whose main activity is researching and developing new products from sturgeon and optimising production methods to become a regional and national reference for sturgeon and caviar production.
- ▶ **SOUTHTEK.** *Spin Off* from the CSIC, whose main activity is manufacturing oceanography equipment which is precise, robust, user-friendly and inexpensive. Its speciality is in manufacturing buoys which are easy-to-use in coastal and sea experiments.
- ▶ **BIORIZON.** *Spin Off* from the University of Almeria, whose main activity is the use of microalgae in intensive and organic agriculture, developing unique techniques and processes to help plants and fruit trees grow better, enhancing their colours and using physical traps.
- ▶ **GOBIUS.** *Spin Off* from the University of the Algarve, whose main activity is developing products and services for scientific communications and education.
- ▶ **NOBELTI R&D Engineering.** *Spin Off* from the University of Huelva, whose main activity is



The physical oceanographer Agueda Vázquez during the preparation of the drifting buoys designed and produced by the company SouthTek, a spin off from CEI-MAR (ICMAN-CSIC)



Tubular culture of biomass in the laboratories of the Spin Off "Algaeengineering solutions" (University of Huelva, CEI-MAR)

ity is conducting research studies, developing, advising, manufacturing and training in areas of industrial problems which use simple and/or complex materials from a thermomechanical perspective, in terms of pressure and other variables.

- ▶ **Phyco Genetics S.L.** Spin Off from the University of Huelva, whose main activity is genetically modifying microalgae to use in research.
- ▶ **Sintering S.L.** Spin Off from the University of Huelva, whose main activity is providing training and scientific, technical or legal consultancy services.
- ▶ **ICCAMB, S.L.** Spin Off from the University of Huelva, whose main activity is researching, developing and innovating in the field of civil engineering and the environment.
- ▶ **LifeBioEncapsulation.** Spin Off from the University of Almeria, whose main activity is using macro, micro and nanoencapsulation to make oral administration possible for medication, chemical products, bioactive molecules and cells and in this way increase the effectiveness of these products.
- ▶ **MALACARD.** Spin Off from the University of Malaga, whose main activity is the integral treatment of milk thistle in order to obtain two products: pelletised biomass for energy production and treatment and silymarin seed extract, a highly recom-

mended product for liver diseases among other benefits.

- ▶ **Mirabilis. Acuicultura Sostenible Ltd.** Spin Off from the University of the Algarve, whose main activity is producing oyster seeds. This company won in the "Production and Processing" category as part of the second edition of the business and innovation Crédito Agrícola Award.
- ▶ **Pharmaplant; Dandlen&Vasques.** Spin Off from the University of the Algarve, whose main activity is making products for the cosmetic, pharmaceutical and food industries. It also works in the biotechnology field. It has a European registered trademark "Pharmaplant", under which it is preparing to launch its own line of cosmetics.
- ▶ **Alga Development, Engineering and Services S.L. (Algades).** Spin Off from the University of Cadiz, whose main activity is specialised consultancy services in microalgae production biotechnology. Its business activity includes assessing, designing and project managing the design and development of microalgae biotechnology as well as the construction, launch, operation and optimization of microalgae production processes.
- ▶ **Algaeengineering Solutions S.L.** Spin Off from the University of Huelva, whose main activity is designing, manufacturing and optimising



microalgae production systems to produce products of pharmaceutical, nutritional and commercial interest.

We should also add other initiatives linked to **CEI·MAR** programmes, such as: **Flor de Garum**, first prize of **atrÉBT!@ CEI·MAR 2013** but which was finally acquired by the company, *El Majuelo* incorporating the production of the product as a distinguished line in the business (<http://bit.ly/2ctb72X>); and the birth of other companies such as *Start Ups* which have come about thanks to the support of their corresponding Campus initiatives.



ROLE OF THE PARTICIPANTS

Member participation has been extended to the entire partnership through the Inter-institutional Committee for Knowledge Transfer and the transfer units from each partner institution, who actively collaborate in the Committee for Knowledge Transfer. This happens with each of the lines of action developed. Apart from the institutional involvement, dozens of researchers and technicians have been involved in developing the "Creating awareness around marine-related opportunities" actions, and in approaching entrepreneurial initiatives.



MOST SIGNIFICANT RESULTS

- ▶ Creation in 2011 of the *Spin Off Aqualgae, S.L.* from the UAL <http://goo.gl/KfNMV0>.
- ▶ Creation in 2011 of the *Spin Off EISMETHODS, S.L.* from the UHU <http://bit.ly/2cBPE4M>.
- ▶ Creation in 2011 of the *Spin Off Aquatic BioTechnology* from the UCA <http://bit.ly/2c5wnuA>.
- ▶ Creation in 2012 of the *Spin Off Caviar Portugal* from the UAlg <http://bit.ly/2ch0xux>.
- ▶ Creation in 2012 of the *Spin Off SOUTHTEK* from the CSIC <http://bit.ly/2cyIQWZ>.
- ▶ Creation in 2012 of the *Spin Off BIORIZON* from the UAL <http://bit.ly/2cBQAX6>.
- ▶ Creation in 2013 of the *Spin Off GOBIUS* from the UAlg <http://bit.ly/2ch2l6M>.
- ▶ Creation in 2014 of the *Spin Off NOBELTI R&D Engineering* from the UHU.
- ▶ Creation in 2014 of the *Spin Off Phyco Genetics S.L.* from the UHU.
- ▶ Creation in 2014 of the *Spin Off Sintering S.L.* from the UHU.
- ▶ Creation in 2014 of the *Spin Off ICCAMB, S.L.* from the UHU.
- ▶ Creation in 2014 of the *Spin Off LifeBioEncapsulation* from the UAL <http://bit.ly/2cBQAX6>.
- ▶ Creation in 2014 of the *Spin Off Malacard* from the UMA.
- ▶ Creation in 2015 of the *Spin Off Mirabilis* from the UAlg <https://goo.gl/3s1Srg>.
- ▶ Creation in 2015 of the *Spin Off Pharmaplant; Dandlen&Vasques* from the UAlg.
- ▶ Creation in 2015 of the *Spin Off Alga Development, Engineering and Services S.L. (Algades)* from the UCA.
- ▶ Creation in 2015 of the *Spin Off Alganeering Solutions S.L.* from the UHU <http://goo.gl/zC4dft>.
- ▶ Agreement of the Official College of Marine and Ocean Engineers of Spain (COIN) to encourage a **maritime entrepreneurial ecosystem**, linked to the *Blue Growth* policy and the maritime sector opportunities that can be seen in the main Blue Economy areas, with the support of the "Blue Ocean" Business Angels network. (<http://goo.gl/m4TPdt>).



- ▶ Maritime Entrepreneurship Ecosystem Project for Atlantic Europe. Presented in the Atlantic Europe Programme on entrepreneurship in the Blue Economy sector. Accepted into the *3rd Atlantic Stakeholder Conference "Promoting Entrepreneurship and innovation in the Atlantic Area"* (<http://bit.ly/2c19SbA>).
- ▶ Creation and implementation of the *Annual schedule to promote and develop entrepreneurial culture and generate knowledge-based companies, in the marine-maritime field* **atrÉBT!@ CEI· MAR.**
- ▶ Participation in creating the **EMPLEMAR** project as part of the **CEIMARNET** network.
- ▶ Design and implementation in 2014 of the training module *Creating innovative companies and projects* in marine-related masters courses.
- ▶ **CEI· MAR's** participation in the **TRANSEBT Forum**: <http://goo.gl/Fhj9q7>.



INTERNATIONALISATION ACTIVITIES

- ▶ Implementation of the International Cooperation Programme "UTP Emprende" with the Technological University of Panama, funded by the AECID 2010 call for proposals, and led by the University of Cadiz. Project that has opened up collaboration

MAJOR SETBACKS IN PROGRESS TOWARDS ACHIEVING GOALS

The results obtained have been in line with the proposed objectives and have had a bigger impact than expected, both regarding the creation of companies, particularly *Spin Offs*, as in the process of building a **CEI· MAR** Entrepreneurship Ecosystem in the marine sector. With regards to the latter, **foundations** have been laid nationally and internationally so that in the very near future it is highly influential and has a strong international profile, in connection with the **CEI· MAR** Innovation Ecosystem.

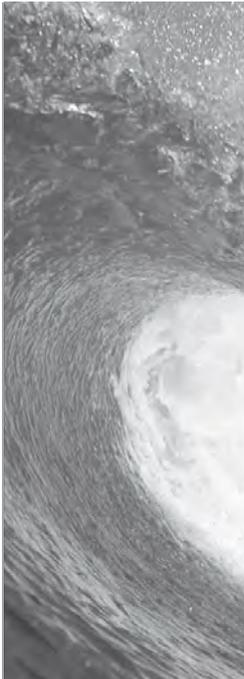
in entrepreneurship programmes with Latin America.

- ▶ Formation of an international consortium, made up of **CEI· MAR** universities located in the region of the Atlantic Action Plan (*University of Cadiz, University of Huelva and University of the Algarve*), University of Vigo (*Campus do Mar*), **MARITIME JOBS - coordinator of the "Blue Ocean" Business Angels Network** -, Innovation Agency of Andalusia (IDEA), Innovation Agency of Galicia, COIN and *Bangor University*, to promote an innovative business spirit in the European maritime sector. This consortium has developed a project within the framework of the European Atlantic Programme.
- ▶ Design of a *Workshop* on entrepreneurship in the Blue Economy which will run in the *3rd Atlantic Stakeholder Conference "Promoting Entrepreneurship and innovation in the Atlantic Area"*, to be held on 27 September in Dublin. <http://goo.gl/SDxxeb>.
- ▶ Development of the **TransEBT** project within the framework of **POCTEP**, finalised in 2013, with the participation of universities from Huelva and the Algarve. <http://goo.gl/l5HK2F>.
- ▶ Participation in the cross-border **TRANSEBT** meeting on 12 June 2014 in Huelva.





SECTION B.7. CEI-MAR Infrastructure

Strategic area	Scientific and Knowledge Transfer Improvement
Programme	CEI-MAR Infrastructure
Objectives	Objective: Enhance infrastructure to adapt them to CEI-MAR's research potential.
	<p>From this general objective, we can pick out the following specific objectives proposed in this programme:</p> <ul style="list-style-type: none"> ▶ Promote the shared use of facilities by CEI-MAR members with a collaboration agreement between all participating institutions. ▶ Have an Oceanography Ship for the CEI-MAR partnership through refurbishing the UCADIZ ship. ▶ Put in place unique Laboratories, Services and CEI-MAR Marine Research Equipment. ▶ Put in place the Environmental Observatory for the Strait of Gibraltar ▶ Create web platforms with oceanographic data of interest to coastal waters. ▶ Attain facilities, agreed by all partners, through CEI-MAR institutions applying for grants. ▶ Create a Centre of Marine-related Business Transfer aimed at scientifically and technologically supporting companies and promoting marine-maritime business entrepreneurship. ▶ Define a network of institutes, held as a benchmark due to its research quality, throughout the CEI-MAR region.

INITIAL OBJECTIVES FROM THE 2011 PROPOSAL

In the **2011 REPORT**, **CEI-MAR** proposed the same objective which is still in place: *Enhance facilities to adapt them to CEI-MAR's strong research potential.* To achieve this objective, several actions were suggested in order to create new facilities and enhance existing ones. The following actions were specifically mentioned:

- ▶ Creation of an International Centre for Research and Transfer of Knowledge on the Southern European Sea (CIITMAR).
- ▶ Network of Research Centres and Institutes.
- ▶ Vessels, Unique Laboratories, Services and **CEI-MAR** Marine Research Equipment.

- ▶ Creation of the Environmental Observatory of the Gibraltar Strait.

Implementing these actions would cost a lot of money. The funds raised by the Campus of Excellence when it started, 4.8 M€, are clearly inadequate to meet the objectives set out in this area, so it opted to apply for subsidies, and use some of the partnership's funds to co-finance facilities attained, when necessary. During the project execution stage, **CEI-MAR** has obtained 9.5 M€ of external funding for scientific facilities and they have another 7 M€ pledged. Thanks to this large investment, proposed actions have been able to do more than was even initially anticipated, as indicated below.

Until recently it was not possible to achieve sufficient funding to carry out the creation of the International Centre for Research and Transfer



of Knowledge on the Southern European Sea (CIITMAR), which needs considerable investment. This building will now be funded within the scope of the Andalusia Innovation Strategy 2020 (EIA2020) which will expand to the Integrated Regional Investment for Cadiz (ITI Cadiz) during the period from 2014-2020. We will later refer to this under the heading, *Description of Work Accomplished*. Thanks to this funding, it has been possible to achieve this objective through creating the Business Transfer Centre. This centre has already been highlighted in section B.4., although it will also be mentioned in this section due to its importance in the Campus research and transfer development.

In relation to the second action, CEI-MAR University research institutes have been linked to CEI-MAR and have developed new institutes associated with maritime-marine research activity. The network of institutes is currently distributed throughout the Campus region and gives scientific and technological support to the entire partnership. In addition, the international connections of these institutes help raise CEI-MAR's international profile, boosting its internationalisation vocation.

The third of these actions has been split into multiple paragraphs with different focuses. One describes the agreements made to share research facilities; another defines the unique laboratories created and their scope in Campus research; a special role is given to the implementation of UCADIZ, achieved with a grant from the Ministry, and available to be used by the entire partnership; and another addresses the various facilities obtained during these past years to promote the scientific and technical work done by Campus researchers.

Finally the last action relates to the creation of the Environmental Observatory of the Gibraltar Strait. It also integrates work done in other oceanographic databases generated in CEI-MAR.

All of this means that the objectives and targets initially proposed have been exceeded by a large

margin, generating an infrastructure network of excellence with a considerable focus on spreading this knowledge overseas. It is generating a significant increase in the partnership's scientific productivity.

• • • • •

DESCRIPTION OF WORK ACCOMPLISHED

The topic discussed in this section was held as a priority both in the objectives decided when the Campus of Excellence was set up and in the recommendations in the CEI-MAR 2011-13 Progress Report. During the execution stage, this project has worked on developing new research facilities as well as improving already existing ones.

In the evaluation stage, significant investment has enabled considerable improvements in the partnership's scientific and technological equipment. With the aim of making the most of funds acquired by the Campus of Excellence, the decision was made to apply for external grants and co-finance the facilities obtained with partnership funds. In total, since 2012, €9,583,862.74 has been received for scientific facilities from grants and another €7,026,407.98 has been assigned. These funds come from national and independent subsidies, funds from CEI-MAR partner institutions and one-off investments from FEDER funds. It is worth pointing out the following items:

- ▶ €2,214,197.13 awarded to improve scientific and technological facilities and equipment from the Andalusian Knowledge System Agents (Ruling by the General Secretary for Universities, Research and Technology on 30 December 2013).
- ▶ €2,193,978.18 awarded within the Government Subprogramme for Scientific and Technical Facilities and Equipment, under the umbrella of the Government Programme to Promote Scientific and Technical Research of Excellence taken from the Go-



vernment Plan for Scientific and Technical Research and Innovation 2013-2016. (Resolution granted: 10 December 2014).

- ▶ €1,104,856.58 under the call for grant proposals from the Andalusian Regional Government's strengthening projects (Ruling of the Department of Economy, Innovation, Science and Employment, which has awarded the University of Cadiz a one-off grant for its Capacity Strengthening Programme in R+D (2014-2015).
- ▶ Other public subsidies (MACOMA and Interreg): €660,830.85.
- ▶ €3,500,000 to build the Business Transfer Centre (CTE), with funds from the Cadiz Integrated Regional Investment (ITI Cadiz).
- ▶ €2,026,407.98 awarded within the Government Subprogramme for Scientific and Technical Facilities and Equipment, under the umbrella of the Government Programme to Promote Scientific and Technical Research of Excellence taken from the Government Plan for Scientific and Technical Research and Innovation 2013-2016 (resolution status at time of writing this report is provisional).
- ▶ €5,000,000 M to equip the CTE from funds from the Cadiz Integrated Regional Investment (ITI Cadiz).

From CEI-MAR beginnings, the partnership's coordinators have sought to put in joint requests for facilities. The partnership agreed to coordinate grant proposals for large facilities to avoid creating duplicates in the Campus, and therefore optimise economic resources among the institutions.

This has been the case during the last five years, both for regional calls for proposals and those called by MINECO or the Ministry of Education, Culture and Sports and for most of those resulting from FEDER funding. In addition, the majority of these proposals were co-financed with CEI-MAR's own funds.

- ▶ Some of the most prominent facilities achieved in the last few years include:
- ▶ System to analyse particles through laser diffraction.
- ▶ Flow cytometer.
- ▶ Organic Carbon Analyser for sea water.
- ▶ Allocation of Signal Theory and Communications Area laboratory at UCA to develop ICT for the marine field.
- ▶ Testing laboratory for water radiology.
- ▶ Remotely operated vehicle (ROV).
- ▶ Sub bottom profiler.

As mentioned in the section on initial objectives, and in line with the wider and more ambitious actions undertaken, this section will describe the main achievements and steps forward during the period being assessed by the Campus.

1.- Network of Marine-Maritime Research Institutes

All Campus of Excellence research and training takes place throughout the CEI-MAR region in the various Faculties and Schools as well as in marine-related Research Institutes. These institutes serve the whole region as they are located along practically the whole Campus coast, from the south of Portugal to Eastern Andalusia and they provide research support to each of the CEI-MAR coastal areas. Some of these



In the image, rectors and coordinators of CEIMARNET, the marine Spanish Campus of Excellence network



Research Institutes were already functioning in 2011 when the Campus was established. Others have been created since, attempting to cover the existing regional and thematic needs and gaps. Most of the Scientific Facilities acquired and shared by the partnerships can be found in these institutes, facilitating access to all member researchers. As part of this work of enhancing these institutes and with the idea of optimising CEI-MAR acquired equipment, CEI-MAR applied for a MINECO grant for Technical Support Staff and were granted three technicians who will be essential in exploiting the potential of the facilities acquired.

These institutes became the spearhead for CEI-MAR's internationalisation work. Most of the conferences of excellence described in section B.5. were organised by researchers who were taking part in visits or longer stays in aforementioned institutes. In addition, the aggregation of researchers in these facilities has enabled the creation of associations which have been the starting point for national and international project requests.

The following section will briefly describe the 7 research institutes belonging to the CEI-MAR Network:

(i) Centre for Marine and Environmental Research (CIMA), Portugal.

The Centre for Marine and Environmental Research was created in 1998 and is made up of scientists from various areas of Science and Technology from the University of the Algarve and other institutions. Its activity ranges from advanced training to masters or doctorate level. It develops research projects and provides analysis and consultancy services to the community. This activity takes place in the installations at the Faculty of Marine and Environmental Sciences (FCMA) at the University of the Algarve and at the CIACOMAR centre in Olhão.

[\(Access to CIMA\)](#)



CEI-MAR includes an important research institute network including institutes like the Institute for Marine Research (INMAR)

(ii) Centre of Marine Sciences (CCMAR), Algarve.

CCMAR is a private science research unit linked to the University of the Algarve. Together with CIIMAR "Interdisciplinary Centre for Marine and Environmental Research" from the University of Oporto, it makes up CIMAR, the biggest research unit for the field of Marine Science in Portugal. This research centre is organised into two main divisions: "Aquaculture and Biotechnology" and "Living Resources".

[\(Access to CCMAR\)](#)

(iii) Marine Research Institute (INMAR), Cadiz.

The Marine Research Institute INMAR was approved by the Andalusian Government Council on 30 June 2016 after receiving a positive assessment from the Andalusian Agency for Quality Assurance. This is, therefore, a new creation in the outworking of CEI-MAR. This university institute is located in the Andalusian Centre for Marine Science and Technology CACYTMAR. INMAR aims to promote awareness of the regional capacity in scientific, technological, educational and productive sectors in the fields of marine sciences and technologies. It aims to strengthen and develop it through promoting and carrying out research and development activities in line with the Research and Innovation Plan for Andalusia; the Campus of International



Excellence plans to improve science; and the Strategic Plan for the University of Cadiz. Furthermore, it should promote the dissemination of research outcomes among society and carry out teaching activities related to specialised courses, postgraduate and doctorate studies as well as providing consultancy services to the public administration and companies in related fields.

(Access to INMAR)

(iv) Earth System Research Institute in Andalusia (IISTA), Granada.

The Inter-University Institute for Earth System Research in Andalusia (IISTA) was created as a result of the changes to the Andalusian Environmental Centre (CEAMA). Its general objective is to promote scientific and technological knowledge, development and innovation within the Earth System field: Atmosphere, Hydrosphere and Earth Crust and its ecosystems, taking into account its involvement in socio-economic and environmental development, and encouraging its knowledge transfer to Public Administrations, Organisation and Public and Private Companies. The Institute was birthed with the aim to contribute to the Knowledge-Based Society and to be involved in the Andalusian Knowledge System, encouraging its interaction with different participants, doing quality research, promoting knowledge-transfer to the productive sector and being committed to updating the Andalusian Administration's human resources and tools. Currently, IISTA is home to a consolidated research group of excellence with various years of experience between them in research projects and R+D+i. It also has a good set of laboratories and field devices.

(Access to IISTA)

(v) International Centre for Ecological and Environmental Studies and Conventions (CIECEM), Huelva.

The International Centre for Ecological and Environmental Studies and Conventions is an An-

dalusian Research Plan Centre which reports to the University of Huelva. Currently, the CIECEM is considered an organisation under the University of Huelva for scientific research as well as transferring and disseminating research outcomes. It is an operational framework for specialised scientific services, which is currently found in constant growth, continually growing its technical, research and productivity potential.

(Access to CIECEM)

(vi) Joint Research Institute in Marine History and Archaeology for the Atlantic and Mediterranean (INHAMAR), Cadiz.

An institute in its earliest stages resulting from the potential that CEI-MAR's "marine cultural value" strategic area has. The excellent relationships between the partnership members together with the investment in facilities aimed at strengthening research activity in subaquatic archaeology have given way to a proposal to create a Research Institute which pulls together all this research potential for marine-maritime historic heritage. Important examples are the researcher leadership in areas of work related to crossing the Strait of Gibraltar in Prehistory and Antiquity, Pleistocene and Holocene human settlements, the History of Fishing and the Maritime Economy in Classic Antiquity, Monetary History, Archaeometric studies in archaeological product movement through diverse societies throughout History, among others. These studies have been developed in emblematic archaeological sites such as in Baelo Claudia and Gadir/Gades in the Community of Andalusia; and in Benzú in the Strait area, and beyond our borders in Morocco (for example, in Tamuda) and in Italy (Pompeii and Herculaneum). At this point, we should also add the current doctorate programme in Maritime history and Archaeology as part of EIDEMAR, the implementation of the masters in Nautical and Underwater Archaeology or the recent use of the UCADIZ oceanography vessel, the first Andalu-



sian vessel completely adapted for underwater archaeological work. Currently there are negotiations with the Department of Culture to set up a Joint Research Institute between the UCA and the Department of Culture incorporating the Institute of Andalusian Heritage as well as the Centre of Underwater Archaeology, member of the CEI-MAR partnership.

(vii) Institute for Research and Innovation in Biomedical Sciences in the Cadiz Province (INiBICA), Cadiz

Joint health research institute in early stages. On 3 May 2016 the protocol was signed between the University of Cadiz and the Department of Health from the Andalusian Regional Government to create the Institute. The INiBICA is strongly committed to developing first-class, global, multidisciplinary and integrated biomedical research, with the collaboration of researchers and normal and clinical teams familiar with the healthcare and clinical reality, aimed at solving health related problems. The institute deals with the following research areas: Neuroscience and Behaviour, Inflammation, Onco Haematology, Epidemiology and Public Health, Innovative Procedures and Therapies - Emergent and Rare Diseases. Taking into account the link between the Cadiz Province and the sea as well as the existence of CEI-MAR, Campus of Excellence of the Sea, INiBICA will develop a Multidisciplinary Cross-Border Programme of Science and Business Knowledge Transfer aimed at Health based on marine resources.

<http://bit.ly/2c0xyc3>.

2.- CEI-MAR UCADIZ Oceanographic Research Vessel .

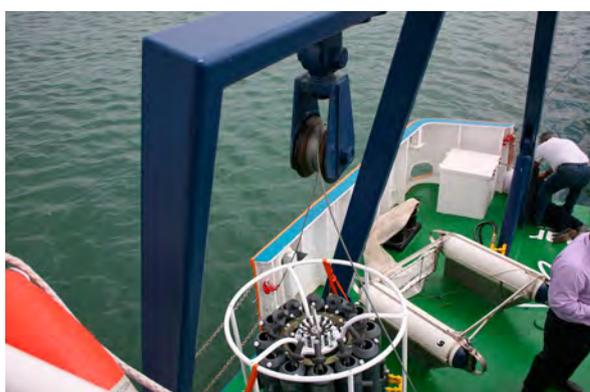
Aware of the need to equip the Campus with facilities that enables it to conduct oceanographic expeditions throughout its area of influence, the CEI-MAR Foundation Board of Trustees decided to address a shared request which would be led by the coordinating university and

co-financed with the CEI-MAR partnership budget. Having an oceanographic vessel for marine research, for the use of CEI-MAR partner institutions, would contribute significantly to improving research. At the moment CEI-MAR researchers use oceanographic vessels managed by the COCSABO (Committee to Coordinate and Monitor Oceanographic Vessel Activity), all of which are located far from the coasts where CEI-MAR does its research. An added advantage of this vessel is the fact that it is multi-purpose, including state-of-the-art equipment for oceanographic research as well as for underwater archaeological studies, a unique and strategic area of CEI-MAR's work.

The university that put in the request, prioritised the refurbishment of the UCADIZ vessel for CEI-MAR oceanographic research over its other applications for facilities in the 2013 Round of Grants for Scientific and Technical Facilities and Equipment (Government Subprogramme for Scientific Facilities and Equipment from the Ministry of Economy and Competitiveness). (application UNCA13-1E-2090). This project was carried out by refurbishing the UCADIZ vessel, a fishing boat donated to the UCA, as a result of a Tax Agency seizure. It was converted into a multi-purpose Oceanographic Research Vessel which can be used in all areas of the Campus' specialisation.

The amount granted for this action was 1,821,351.29 euros, of which 319,052.86 euros were co-financed with funds from the partnership. The vessel is 25 metres in length and 7.5 in width. It can carry 12 researchers and 5 crew members, which categorises it as medium-sized and can be used regionally and nationally, from the coast to the continental slope, a very interesting area for research carried out at the Campus.

Comprehensive participation has converted the UCADIZ vessel into a first-class scientific facility, equipped with the latest scientific and navigation equipment which can provide support to tasks related to research, innovation, knowledge transfer and teaching in various fields of



Gallery of images of the exterior and interior of the UCADIZ, the first Spanish university oceanographic vessel

knowledge such as Biological Oceanography, Physics and Chemistry, Hydrography, Environmental Quality as well as Underwater Archaeology. The vessel's adaptation went to tender following the current guidelines on contracting (<https://goo.gl/COQ8PF> Official State Gazette no. 129, 30 May 2015). The refurbishment of the UCADIZ took place at Pecci de Barbate Shipyard (Cadiz) and generated almost 100 jobs directly and indirectly in the shipyard area. (<http://goo.gl/aKkbwu>).

This project has adapted spaces for work and others to accommodate the crew and scientists, serviced the engine room and electrical installations and installed the latest scientific and bridge equipment. Thanks to this involvement, the UCADIZ is equipped with the necessary scientific equipment to move forward in projects in different areas where scientists, national and international researchers and CEI-MAR research groups work. Its resulting equipping clearly improves the Campus. Among the devi-

B.7. CEI-MAR INFRASTRUCTURE



Images of the UCADIZ's stern deck before and after the entire remodeling

ces installed on the vessel, a few stand out due to their unique use on vessels of this size. One is the multi beam echosounder which is used to make high resolution bathymetries which will enable the production of high definition mapping as well as detecting unique objects and formations. There are also two gantries, as well as a crane, making the boat incredibly versatile. The gantry is 6 metres tall and is a unique feature on an oceanographic vessel of this size. It enables work with large vibrocorders and core tubes. The Starboard gantry is 3 metres tall and is highly versatile for lowering oceanographic equipment such as rosettes or CTDs. In addition, it has a CO₂ exchange measuring system which makes it possible to carry out studies on the oceans' contribution as sources or drains of CO₂ with implications for climate change studies. It should be highlighted that adapting part of the vessel to carry out underwater archaeological research is unusual on oceanographic vessels with these technical attributes; as is having a low pressure compressor for intervention efforts.

The vessel has a dry laboratory and a wet laboratory for oceanographic campaigns, bridge equipment made up of navigation with ARPA radar installations, electronic chart display system (ECDIS), navigation data information display, control system (Gyroscope / Automated Pilot), GPS/DGPA receptor, alarm panel, sounding line, chip log, wind system and GMDSS radio console in different versions and areas of coverage.

Furthermore, its scientific equipment includes a CTD probe with oceanographic cable, multi-parameter CTC probe self-contained for shallow waters, a Portasal salinometer, 75 kHz and 600 kHz current profilers, a thermosalinograph, a fluorometer, a meteorological station, an undulating CTD with oxygen and turbidity sensors, an advanced deep towed imaging system and a groundbreaking underwater vehicle operated from on-board the vessel (ROV).

The equipment and changes made are described in length in the following lines, indicating in each case what funding has been granted.

**★ Scientific equipment
(funding granted: €424,249).**

The equipment acquired and installed on the vessel includes various CTD probes, one with oceanographic cable with rosette and housing unit SBE 32, another multi-parameter probe self-contained for shallow waters, and another undulating with oxygen and turbidity sensors, a Portasal salinometer, 75 kHz 600 kHz current profilers, thermosalinograph, fluorometer, meteorological station, plankton net for continuous sampling, deep towed imaging system with multiplexer for electromechanical cable with auxiliary sensors, underwater vehicle operated from on-board the vessel (ROV), pCO₂ continuous analyser, potentiometric valuator, as well as multidisciplinary laboratory material.



**★ Remodelling work on the Vessel
(funding granted: €778,000).**

The remodelling carried out on the vessel includes the following actions: On the top deck, cabins and bathrooms for crew have been remodelled, the multi-purpose room transformed, the Starbord gantry and winch assembled, along with the crane to move heavy weights (1500kg when arm is extended), inflatable auxiliary vessel delivered and assembled. On the main deck the stern gantry and winch have been assembled (having eliminated the obstacles on the stern deck), as has the access stairway to the hold. The door at the entry point to go down to the machines has been changed, the port stern rail has been opened up in order to operate gantries, the cabins, lounge-dining room and bathrooms have been remodelled, the dry and wet laboratories prepared, acoustic insulation has been installed in the stern area and the multi-purpose laboratory has been prepared. In the hold, the cabins for researchers, laundry and storage space have been remodelled, and in the hull, casing has been installed for storing echo-sounders and current profilers. An auxiliary propeller has been assembled to improve functionality in taking samples in oceanographic stations.

The vessel contains cold storage facilities in the storeroom of the bow, cold room and chest freezer in the hold and fridges and air conditioning in all areas. The propulsion engine has been completely overhauled and a preparedness system for "Unattended Machine" situation which signals distance and synchronism. The auxiliary engines and coupled alternators have been overhauled and soundproofed, an auxiliary port/docking engine has been assembled, diesel treatment equipment and electric switchboard, valves and pipes in the engine room and in the fire protection system have also been overhauled and corrected.

**★ Equipment incorporated into the bridge
(funding granted €303,000).**

A navigation system with integrated equipment (ARPA radars, ECDIS mapping system, Naviga-

tion data information display, control system (Gyroscope / Automated Pilot), GPS/DGPA receptor, alarm panel, sounding line, chip log, wind system and GMDSS radio console in different versions and areas of coverage). The bridge includes a gyro compass, electronic chart display system (ECDIS), AIS automatic identification system and INMARSAT data transmission service.

**★ Equipment purchased for nautical and underwater archaeology
(funding granted €403,313.25).**

Recently, the Secretary of State of Research, Development and Innovation gathered to approve the 2015 round of grants for scientific and technical facilities and equipment as part of the Government Subprogramme for Scientific Facilities and Equipment. The "Official State Gazette" No. 14, 16 January 2016, grants, among other things, additional funding to provide scientific and technical equipment for the Laboratory of Archaeology and Prehistory research area at the University of Cadiz for the amount of €403,313.25. This provides equipment in a space for cataloguing and storing archaeological samples obtained as well as equipment for the specific underwater archaeology UCADIZ vessel.

The phenomena of marine sedimentation, especially intense in areas close to river mouths such as is the case in the Bay and Gulf of Cadiz, buries archaeological remains and underwater heritage, which are the priority research objective for the strategic area of Nautical and Underwater Archaeology (See <http://bit.ly/2c07uD9>).

This problem, which has caused an important gap in underwater archaeological research, has occurred. However, it is also an advantage because the burial of the archaeological remains has favoured their conservation against plundering and natural phenomena especially mechanical and biological. To uncover these remains, funding is available to purchase the following equipment:



- ▶ A mobile dredger will allow work on any buried archaeological site from the UCADIZ vessel, making it possible to remove the superficial sediments from the area of research in a few hours, allowing access to archaeological sites still unexplored. This will also save costs for a job that if done manually would be a project in itself.
- ▶ A biometric sub-bottom profiler, dual frequency which uses geophysical methods to go deep in marine sediment revealing the detailed layout of its layers and elements (archaeological or natural) trapped between them. This echosounder should be suitable for sandy bottoms and shallow waters. The result obtained from these sedimentological profiles will allow us to establish more productive research strategies. Furthermore, equipment with these characteristics has multiple uses, not only archaeological, but also geological, oceanographic, ecological or hydrographic.

CEI-MAR's acquisition of this equipment will give it clear competitive differentiation with respect to other institutions not only on the Iberian Peninsula, but worldwide, improving the partnership's research possibilities.

★ **Adapting the docking location to create storage for UCADIZ (Cost of action €12,399.28).**

The UCADIZ ship docks in the port of Cadiz and it has been necessary to adapt a storage unit at the port as a support to this facility. The scientific equipment is kept in this storage unit when it is not in use in the UCADIZ. The space has been granted by the Port Authority of Cadiz to **CEI-MAR**. Actions taken have included lighting, reparations, compartmentalisation in aluminium, enclosures and adapting fire safety equipment.

The president of the Andalusian Regional Government, Susana Diaz, and the State Secre-



The UCADIZ presentation ceremony was attended by various authorities including the secretary of State Research, Carmen Vela and the President of the Andalusian Regional Government, Susana Díaz

tary for Research, Carmen Vela, among other authorities, attended the presentation ceremony for the oceanographic vessel UCADIZ. (Link to news bulletin: <http://goo.gl/BXookB>).

The management and coordination of the UCADIZ vessel use is carried out by a committee involving the coordinator of **CEI-MAR**, the president of the inter-institutional committee for research, the coordinating team for the International Doctoral School in Marine Studies (**EI-DEMAR**), as well as research representatives from research areas that use the ship: Physics, Chemistry, Underwater Archaeology, among others. In the following link you can access the website to reserve the vessel. It can be used by any potential user, including international external researchers in addition to those belonging to the **CEI-MAR** institutions <http://bit.ly/2cC1lrw>. This Committee's functions, defined in its regulation, are:

1. Planning the annual scientific and technical expeditions for the vessel, including the allocation of time corresponding to the research projects.
2. Analysing the needs of scientific equipment, technical capabilities, support staff for research and other resources and facilities required to make expeditions happen.
3. Monitoring and assessing such proceedings periodically.



Warehouse to support the UCADIZ vessel in the port, Cadiz fishing boat before and after its modification



The UCADIZ during its navigation trial after its remodeling

4. Evaluating expedition costs for the vessel, at the initiative of the managing bodies, reporting to the agencies that funded the research projects.
5. Drawing up and approving an annual report on the degree of implementation for activities under coordination.
6. Fulfilling other necessary functions to properly coordinate activities entrusted to the ship.

At this time we already have a first preliminary timetable in which the ship is going to be of service to several research projects that need this facility, with projects from the IACT-CSIC, ICMAN-CSIC, the IEO, the University of Cadiz and the University of Malaga, among others. A prospecting expedition in two archaeological sites close to the Bay of Cadiz has also been scheduled.

3.- Network of facilities shared by CEI-MAR members.

The programme's main objective is to facilitate the use of infrastructure, laboratories and services offered by the central services of each institution participating in the CEI-MAR partnership. A specific agreement for this has been drawn up for the member universities to sign for collaboration between laboratories and central research services within the CEI-MAR setting. This finalised agreement has favoured collabo-

ration among CEI-MAR institutions, and can be examined on the Campus website (<http://bit.ly/2c7m89n>).

The agreement's annex lists more than 200 major facilities, worth several hundreds of millions of euros in total, available to be used by the whole CEI-MAR partnership. It also highlights the large number of research support units such as microbiology laboratories, a high performance computing service, an electronic microscopy, radioisotope laboratories, elemental analysis laboratories, chromatography laboratories, biomolecule analysis, nuclear magnetic resonance services, animal experimentation and production services (aquaculture plant), cellular biology and cytometry services, genomics laboratories, dating and isotopic geology services, mechatronics and electronic systems services, different length boats, and equipment for oceanographic expeditions, among others.

In addition, and following the CEI-MAR philosophy, work is being done on stocktaking and finalising the shared use agreement for specialised facilities and services across all the marine-related Campus areas that make up the CEI-MARNET network, which is currently chaired by CEI-MAR. The work is led by the "Facilities Work Group" coordinated by CEI-MAR (Link to news, <http://goo.gl/yB0TB3>).

The shared use of boats to facilitate research activity among partnership members is of particular interest. We would also like to highli-



ght the international participation of **CEI-MAR** members in the European project, EUROFLEETS 2 (New operational steps toward an alliance of European research fleets), a programme which aims to share the oceanographic fleet within Europe. **CEI-MAR** researchers have particularly benefited from the geological oceanographic capabilities of some European vessels included in this programme, with multi-channel seismic equipment. In addition, the presence of **CEI-MAR** researchers in The Committee for Coordination and Monitoring of the Oceanographic Vessel Activities (COCSABO), reporting to the Ministry of Economy and Competitiveness, has enabled several of the partnership's research projects use these facilities both in research activities and for training, as in the case of the Masters in Oceanography, doing practices on the Sarmiento de Gamboa or Hesperides ship's crossings for various studies.

4.- Creating unique laboratories, services and equipment for **CEI-MAR** marine research.

During the period under evaluation, **CEI-MAR** has progressed significantly in developing unique laboratories that incorporate state-of-the-art services relating to maritime-marine research, in many cases improving existing facilities and in others incorporating new facilities. It has sought to optimise the partnership's activity through coordinating participation in requesting grants, such as that for infrastructure by the Ministry of Economy and Competitiveness, and through using the partnership's own resources both for co-financing and to directly finance the facilities. In this way, they have funded the establishment of laboratories, equipping them and establishing research services with new equipment, available to the international scientific community. This section will describe the main actions related to equipment carried out by partnership members:

LABIMAR

The Marine Research Laboratory (**LABIMAR**) is a key facility for the scientific scope of the **CEI-MAR** Campus of International Excellence of the Sea. It is located in the Castle of San Sebastian in Cadiz, in a space granted by Cadiz City Council and licensed to **CEI-MAR**. It takes advantage of the excellent conditions for marine research in this unique site. The building already had recognised heritage and monumental value and now enjoys a new scientific, teaching and dissemination use in different disciplines related to marine studies. The **CEI-MAR Foundation** acted as an intermediary and promoter of the collaboration agreement between Cadiz City Council and **CEI-MAR** to grant the use of the coastal fort of the Castle of San Sebastian. The license agreement can be found on the evaluators intranet on the Campus website and was conducted on 16 June 2014. Link to the news bulletin, <http://goo.gl/S77dDM>.

The existence of this lab will enable the development of non-invasive marine research in an exceptional environment from a biological perspective. Although the area could be considered highly anthropized, the rocky platform that surrounds the Castle of San Sebastian presents a good degree of conservation as well as a high biodiversity value. It is one of the best examples of this type of habitat in the Gulf of Cadiz. This environment is enabling the development of various projects studying both macro and microbenthos where sampling can be done right next to the laboratory and it is not necessary to transfer the samples far. This decreases its handling and makes it possible to analyse the development and conduct of marine species in their own environment, having all technological requirements to carry out the research *in situ*. In addition, they are also analysing birds on their migratory path, ocean birds that use the coast of Cadiz as a migration corridor as they make their way to the African continent. The castle facilities have been converted into a magnificent observation point to conduct counts.



LABIMAR opening ceremony



Scientific workshop held at LABIMAR

The work that partner researchers are conducting in **LABIMAR** is having a significant international impact and has been included in leading marine research journals.

LABIMAR divides its content and activities into two clearly differentiated spaces: one room for teaching and research and another area for information dissemination and exhibitions. The **LABIMAR** facilities have a laboratory equipped with all the necessary infrastructure to develop scientific research activity with displays of gas extraction, water intakes, and specialised scientific material for living organism studies.

The two **LABIMAR** rooms occupy a surface area of 150 square metres and it has a budget of close to €100,000, funded by strengthening grants from the Ministry of Economy and Competitiveness and the partnership's own funds.

This facility has been widely used since it opened. Several research projects have been carried out focusing both on producing larvae in molluscs (CGL2010-1787) and on physiological cycles of seagrass beds (CTM2011-2482). It has been used as a teaching laboratory in Masters and doctoral degrees from various partner universities (Cadiz, Algarve, Granada, Malaga) and has hosted several marine-related conference series regarding both environmental, humanistic and social aspects (*La Caleta Heritage Days*, *INVESCERCA Conference Series*, *SACMA Symposium* etc.-view section C.2.-). Furthermore, it has been a first-class scientific dissemination centre, which has sought to awaken early scientific vocations among schoolchildren. In its first year, more than a thousand schoolchildren visited (*School trip to Labimar*). Finally, taking advantage of its location and facilities, two edi-



Overhead shot of the Castle of San Sebastián (Cádiz) where LABIMAR is located



Marine studies dissemination activities at LABIMAR.

tions of the Marine Science Fair were attended by almost 5,000 people in total. CEI·MAR activity was shared to the public at these fairs (see sections B.5. and C.2. on dissemination to find more information on all these activities). Link to facebook: <https://goo.gl/kRROIf>.

Nuestra Señora de La Esperanza Saltworks

The La Esperanza Saltworks covers a surface area of 369,000 m² in the heart of the Bay of Cadiz Natural Park. Located in public-owned maritime land, the saltworks were recovered by the Directorate General of Coasts for the Ministry of the Environment and Rural and Marine Affairs in 2007 as part of its "Farm Acquisition Programme". Subsequently, it was given in concession to the coordinating university of CEI·MAR. This concession is granted for the implementation of the "Sustainable Integrated Management of the La Esperanza Saltworks" project. Among other activities, the project includes the exploitation

of artisan salt, "flor de sal" (hand-harvested sea salt), environmental education, ecotourism activities and biodiversity research and conservation. Having this unique space provides the partnership with a unique environment to develop research of excellence in areas of Ornithology, providing a dedicated space to observe birds in an environment unique for its Europe-Africa migration routes, with the possibility of adapting it to meet research needs. Every year the Western Snowy Plover, Little Terns and Black-Winged Stilt nest in this saltworks and other species such as the Eurasian Spoonbill, Black Stork and Osprey (included in the list of vulnerable species) winter there. Some research projects are being developed in this area. For example, a National Plan project with the Doñana Biological Station on the Western Snowy Plover (CGL2011-24230) on which a doctoral student is writing their thesis and which has been the source of inspiration for a publication



Images of the main entrance doorway and the salt evaporation ponds at the CEI·MAR La Esperanza salt marsh



in the *Journal of Avian Biology* which is making an impact.

Furthermore, research studies on algae and microalgae in saltworks environments facilitates the study of new populations and their conduct in changing environments, which can be altered by the researcher. The repercussion these studies are having can have an effect on areas as diverse as Ecology, Marine Biology, Marine Botany and even Food Technology, which is carrying out research to find new ingredients that can be used in modern cooking. The canal structure of the saltworks facilitates the study of microalgae crops which can be used in aquaculture feeding or even in gastronomy. In the last round of grants for Infrastructure by the Ministry in 2015, we got funding to adapt a marine microalgae aquaculture canal into a *Raceway*. The aim is to have a demonstration plant which fosters the use of the Bay of Cadiz environment as a unique place for cultivating marine microalgae which can be used to develop biotechnological products with a high added value such as carotenoids and polyunsaturated fatty acids. These can be used to make nutraceutical products which will encourage companies from the food industry or parapharmacy sector to set up nearby.

CEI-MAR has made an initial investment of 96,416.82 euros in these facilities directed at the partial rehabilitation of the "saltworks house" and the restoration of La Esperanza Grande Saltworks through Interreg III-B Project 159 – SAL. This project aims to put value back into the saltworks identity and the activity associated with it, its restoration and the promotion of the biological, economic and cultural potential of the coastal wetlands. Specific objectives include recognising the importance of the saltworks in nature conservation; saltworks restoration; and organising and shaping the salt gatherer profession in order to add value to the traditional salt produced on the coast.

Likewise, an 80,000 euros donation from the 2011 State Lotteries and *National Geographic*

Dreamers Award has been used to recuperate different saltworks facilities in order to disseminate and spread information on the educational values of the salt marsh. In addition, the Ministry of Agriculture, Food and the Environment has carried out an important environmental regeneration project in the La Esperanza saltworks, investing 484,414.03 euros to carry out the second and third phase of the restoration. The project, submitted in September 2012 to the University of Cadiz, was directed at regenerating the La Esperanza saltworks to make them fully functional. It included hydrologic restoration, reinforcing the pathways, repairing the floodgates, reconstructing the Esperanza Chica salt evaporation pond, cleaning the tide-pools and restoring Esperanza Grande salt evaporation pond, as well as recovering the inherent ethnographic heritage.

Following on from their restoration, research projects focused on using renewable energies in aquaculture or in producing new macrophyte species, such as the following project: *Optimising the open-air harvesting and cultivation of macroalgae for the food industry in the Bay of Cadiz estuaries. Nutritional/Gastronomic potential and environmental implications* as part of the Projects of Excellence by the Andalusian Regional Government (P12-RNM1235).

In addition, various workshops for schools and adults have been conducted aimed at spreading information about saltworks scenery and culture. They have been attended by as many national students as international due to its example of managing a traditional activity in a sustainable way. From these, we can highlight those carried out under the Erasmus Intensive Programme (RAYIP) project. Through this project, students from Iceland, Holland and Italy visited the site and analysed the role of this type of initiative in regional management.

In the last year, the Bay of Cadiz Natural Park has constructed one of their emblematic "Natural Park Doorways" marking it an area of significance due to its level of conservation, use and



CEI-MAR Aula del Mar facilities at the UGR which were visited by representatives of the Sea Observers project (photo on the right)

management. This is one way of making the general public aware of this type of initiative.

Marine Classroom (Aula del Mar)

In **November** 2015, the university of Granada opened its "Aula del Mar", a **CEI-MAR** facility with the aim of directing, organising and fostering all initiatives and activities related to teaching support as well as Graduate and Postgraduate research in **CEI-MAR**'s Specialisation Areas. It also works to raise the social profile of **CEI-MAR** through extended dissemination of its knowledge. Among the many activities it has pursued are:

1. Practical training activities included in Graduate and Postgraduate marine-related subjects, such as Dissertation projects at the end of Graduate and Postgraduate courses (TFG, TFM).
2. Teaching innovation projects.
3. Specialisation courses, including Summer Courses.
4. Conference Series, Virtual Conferences, Seminars, Talks etc.
5. Temporary exhibitions on **CEI-MAR** activities.
6. Collaborations with various Entities and Institutions who specialise in marine studies and management.
7. Activities related to improving the production and scientific quality of marine-maritime research.

8. Specialised service provision to Companies.
Link to facebook: <https://goo.gl/ODCJxy>.

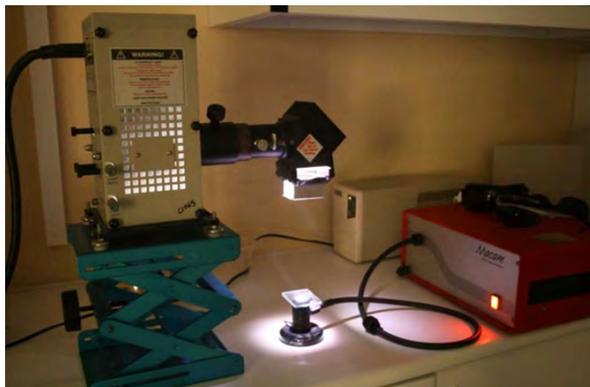
Another installation linked to **CEI-MAR** in Granada is the "Simulation and Modelled Aquatic Ecosystems Laboratory, AquaLab" at the University Institute of Water Research at the University of Granada.

Photobiology Laboratory

In recent years, society has become aware of the potential danger of excess solar radiation to living beings. This has birthed an important field of photobiology research and development. This field examines the rigorous quality control that legislation demands for photoprotection and photostimulation as well as simply researching the effects on living beings in the marine-maritime field.

The **CEI-MAR** photobiology laboratory is located in the University of Malaga and has the latest equipment, a highly qualified team with a wide curriculum of teaching and research experience, and a quality control system that guarantees reliability in measures and facilitates access to all types of organisation that need to use it at very competitive prices.

Since its opening, its progress has been focused on the world of innovation and knowledge transfer. Among its users are protective cream producers and consumer groups, UVA ray manufacturers or beauty salons and tourist consortia who want to offer their clients up-to-date



Scientific instruments from the CEI-MAR Photobiology Laboratory at the UMA

information on radiation levels, their danger and use in terms of Public Health. These facilities are, together with the Institute of Research and Innovation in Biomedical Sciences INIBICA, the main promoters of the CEI-MAR "Health and the Sea" specialisation.

In terms of the services that they offer, we can summarise the following:

- ▶ Determining protection factor.
- ▶ UVA lamp profiling.
- ▶ Quality control for sunbeds in tanning centres.
- ▶ Information on irradiance levels and their measurements on a visible and ultraviolet range.
- ▶ New photoprotection substances rating and trials.
- ▶ Trials on antioxidant activity.

Advanced Primary Production Laboratory

This laboratory is a new CEI-MAR research facility to measure and estimate primary production in marine systems, and can be found on the second floor of the Central Research Support Service (SCAI), in the Teatinos Campus of the University of Malaga. It is a pioneering facility in the partnership and is enhanced by CEI-MAR initiative and funding.



Opening ceremony for the CEI-MAR Advanced Primary Production Laboratory at the UMA

Among the new Advanced Laboratory's progress feature a growth chamber for living elements, a flow cytometer and a premium quality inverted microscope. Moreover, it hosts a seawater circuit which makes it easier to conduct experiments without having to transport water. It is a laboratory that leads in its subject matter, whose facilities are worth around 150,000 euros in total.

This laboratory was opened in March 2015 and is a space for marine studies research and promotion for the CEI-MAR community. In addition, it is an important training space where specialisation courses take place related to primary production topics.

Unmanned Aerial Platform Service

As part of the CEI-MAR project, an Unmanned Aerial Platform Service has been set up for conducting research. This project became a reality when it was backed with a grant from the Ministry of Economy and Competitiveness in October 2014 for scientific facilities and equipment. It was awarded 37,200.10 euros to which the partnership added 10,000 euros of its own funds.

The service is already functioning with a multicopter with 8 motors, one metre in diameter, carrying a maximum of 5 kilos. This includes a clearly visible camera and a second multispectral camera to collect data held on the flight system. Furthermore, this system has automatic pilot control, flight planner, complete FPV, stabilised support for cameras with three axes and



Conducting a topographical survey in wetlands through the use of drones within the European project FAST with researchers from the University of Cambridge

two-way telemetry. In the same way, this service also includes operational equipment that is completely set up and configured, consisting of a hexacopter that is 550mm in diameter with a Pixhawk controller which enables completely autonomous flying planned through software. It also has a three axis gimbal, a GoPro HERO 4 camera and a LIDAR LITE for distance measurement. This system is putting into place the first operational service for aerial imagery for environmental uses.

In recent years, the integration of disciplines such as digital photogrammetry, computer vision and unmanned aerial vehicles (UAVs), undoubtedly raises many advantages with respect to traditional sampling methods employed in studies on the territory, both in coastal areas and in tracking coastal waters. UAVs offer great operational flexibility and versatility on large tracts of land, as well as in difficult to reach places and have become a new easier, faster and less expensive way to obtain Digital Elevation Models (DEM) of great precision that allow you to perform multi-temporal observations on erosion/accretion in coastal areas. Additionally, having multispectral cameras makes them useful in tracking and identifying bodies of water as well as in analysing the presence of vegetation and its evolution in coastal areas.

Furthermore, the establishment of this service will also allow us to offer a diploma in Unmanned Aerial Vehicles and its uses (RPAS) in the

next academic year. As required by the Spanish Agency for Aviation Safety, its academic programme will include the advanced certificate in operating a RPAS of less than 25 kilograms.

Aquaculture Plant

At the Andalusian Centre for Marine Studies, there is a 900 m² aquaculture plant, dedicated to the breeding, supply and use of experimental animals (<http://bit.ly/2c2WkbD>). In this plant, teaching and research activities are coordinated on cultivating commercial aquaculture and auxiliary culture species. This installation aids progress in marine aquaculture with all the possibilities that are of interest in this business sector. In order to develop and promote this highly specialized research activity, two enclosures or "advanced experimentation classrooms" were designed, built and equipped inside the aquaculture plant. One is for fish-farming and the other for auxiliary cultures, especially zooplankton. The action concretely consisted in:

- ▶ Designing and building two classrooms specialising in Aquaculture.
- ▶ Equipping the classrooms with cylindrical tanks for pelagic fish-farming and special trays for benthic fish-farming. Fish feeders. Photoperiod lighting.
- ▶ Pipes and equipment to pump sea water to the facilities.



- ▶ Basic equipment to monitor parameters and metrics of the cultured organisms: scales, oximeters, conductivity meters.
- ▶ System to observation and count fish eggs and auxiliary cultures - stereoscopic magnifying glass, video camera and display.

It is also adapted to receive guided visits with the aim of putting their activities on display to various social groups. This plant is currently recognised in Quality Management, R+D+i, Environment and Charter of Services according to different UNE standards (<http://goo.gl/CuGL-fl>). With regards to educational and training activities, the Aquaculture Plant is a specialised classroom for "Marine Sciences" degrees and the quality accredited Masters in Aquaculture and Fisheries: ACUIPESPA". In addition, each year the aquaculture plant receives several pupils, from the "Maritime Zaporito" Vocational Training Centre in San Fernando (Cadiz), who are studying courses related to aquaculture production, to continue their training in our work centres.

In addition, since CEI-MAR obtained the Centre of International Excellence label in October 2011, it has worked on designing the International Doctoral School in Marine Studies (EIDEMAR). Associated to the Campus of Excellence and EIDEMAR are newly created doctoral programmes, two of which incorporate research areas that will use the CASEM Aquaculture Plant in their specialised doctoral teaching:



Images of the aquaculture plant at the Andalusian Centre for Marine Studies (CASEM) at the UCA

- ▶ PhD in Marine Sciences and Technology: Molecular and Cellular Biology, Genetics and Genomics of Marine Organisms and Microalgae Biotechnology.
- ▶ PhD in Marine Resources: Basic and Applied Aquaculture.

Associated to EIDEMAR and these PhD programmes, highly specialised training courses have been offered in fish farming and auxiliary cultures, as well as in advanced biological analysis techniques related to this cultures. In order to run these courses, it was necessary to have environments relatively isolated from the daily activity of the plant maintenance and species breeding. The spaces needed to be a suitable size to contain necessary equipment to culture the species and handle and fulfil tasks associated with the practical activities of this training.

External financing for these modifications came from the Strengthening Subprogramme of the Ministry of Education, Culture and Sport. A total amount of €88,662.02 was allocated to this action

Geolocation Unit, Analysis and Historical Heritage Georeferencing

This new service was created following the awarding of a grant from the Ministry of Economy and Competitiveness in its round of grants for scientific facilities and equipment announced in October 2014. A total amount of 188,380.00 euros was awarded for this project.





It represents a piece of equipment consisting of two different sized ground-penetrating radars designed for geophysical land studies mainly for historical heritage aims but also for use in the area of geodesy, stratigraphy and external geodynamics. This equipment will be accompanied by dynamic positioning systems such as GPS-RTK to have a perfect profile survey location.

This equipment is already used in some maritime archaeological sites such as the Phoenician archaeological site of the village of Doña Blanca, where they are providing very good results, as well as in the historic cultural surroundings of "Baelo Claudia".

We are currently waiting to sign a collaboration agreement with the Ministry of Culture directed at the coordinated use of this equipment which will allow staff from both administrations to work together on archaeological sites in the region.

At the same time, this technique is very widespread in stratigraphy and sedimentology studies with regards to coastal environments related to the wind dynamic and the rising sea level. Trials have begun together with the University of the Algarve with the participation of true specialists in the matter. In this case the focus has been on the detection of tsunami deposits in the Gulf of Cadiz.

In **CEI-MAR** an important research activity has focused on analysing combustion gases from marine engines for over a decade. Because of this, we are a national and international benchmark as can be seen in published articles and research projects. Researchers working in this area are collaborating with CEDEX (Centre for Public Works Studies and Experimentation) as advisers on the topic of measuring pollutant emissions from maritime transport.

These projects have been developed with different equipment to measure gases from engine combustion installed in maritime power plants in compliance with current regulations reflected in the Implementing Decision (EU) 2015/253 of the European Commission, of 16 February 2015



New ground-penetrating radars for prospecting expeditions in maritime archaeological sites

laying out the rules relating to sampling and reports in accordance with Directive 1999/32/EC of the Council regarding the sulphur content of fuels for marine use and that established in the Royal Decree 61/2006, of 31 January, which determines the specifications of the sulphur content of fuels for marine use, amended by Royal Decree 290/2015, of 17 April.

Researchers from **CEI-MAR** have been required by the General Directorate of the Merchant Navy to advise them in this type of measurements, which would be carried out nationally through a procedure accredited by regulation 17025, whose analysis corresponds to a set of international regulations (**MARPOL 73/78**). This regulation was developed by the International Maritime Organization (IMO), a specialised agency of the UN. Its objective is to preserve the marine environment through the complete elimination of pollution by fossil fuels and other harmful substances, as well as the minimization of possible accidental discharge. On the basis of the Implementation Decision (EU) 2015/253 of the Commission of 16 February 2015 laying out the rules relating to sampling and reports in accor-



dance with the Council Directive 1999/32/EC which Spain is obliged, as a member country of the EU outside a SECA area, to perform documentary inspections of fossil fuel pollution on at least 10 per cent of all ships which call into the nation's ports each year.

Currently in Spain this legislation is in force, but it is going to be subject to inspection by the Ministry of Development in a short period of time. They will study specific Spanish ports under the competence of the Maritime Port Authority with the exception of those that are in Ceuta and Melilla and the Balearic Islands and the Canary Islands. This gives us an important opportunity to expand and complete our investigations allowing us to study the level of compliance by vessels of such regulations.

It is estimated that we could have access to at least 165 vessels during 2016, taking into account the number of ships that have entered over the last three years. This decision requires Spain, as a non SECA bordering country, to monitor at least 20% of all inspections (equating to around 960) through sampling or analysis from 1 January 2016 to 31 December 2019.

In order to do this, it is essential to have a laboratory accredited by ISO 17025 or equivalent, which can do the analysis according to the criteria laid out by the directive. If the results show non-compliance, it must take sanctioning action. At the time of this report the laboratory has been granted and is pending accreditation. This is an excellent opportunity to reinforce the leadership of the CEI-MAR Campus in marine matters.

Inverted Confocal and Fluorescence Microscope System for Marine Research.

The electronic microscopy service available to the CEI-MAR partnership has been qualitatively improved on receiving a scientific facilities and equipment grant to the amount of 433,789 euros in October 2014 from the Ministry of Economy and Competitiveness to build a confocal and fluorescence microscope.



Confocal and Fluorescence Microscope used by CEI-MAR researchers

It is used in research, technological development and innovation for structural materials (shipbuilding industry, offshore and aeronautics and shipbuilding industry) and functional materials (photovoltaics and other optoelectronic materials, electronics, photonic and plasmonic materials, magnetics, catalysers, absorbents and adsorbents and biomaterials). Among its objectives are: enhancing the development of CEI-MAR's research in marine material areas through using advanced material characterisation methodologies; disseminating its capabilities through specialised training activities for institutions and companies in the sector; configuring highly qualified scientific technological integrated and sustainable services that address different business needs associated with their profile; taking advantage of its potential to create technology-based companies that generate socio-economic improvements in productive sectors related to its field; attracting talent at all levels to contribute to reaching CEI-MAR's objectives; and contributing to internationalising all areas of its activity.

5.- Creating online platforms with CEI-MAR oceanographic data of interest.

In 2007, the European Parliament and the EU Council adopted DIRECTIVE 2007/2/CE on Infrastructure for Spatial Information in the European Community (INfrastructure for SPAtial In-



formation in the European Union, INSPIRE). The aim of this DIRECTIVE is to set general rules for establishing spatial information infrastructure directed at applying community policies and actions which can impinge on the environment.

INSPIRE is based on a series of common principles: avoid duplicating efforts in data collection; store them in the most efficient space; retain the possibility of putting together spatial information from various sources across Europe; share this information with multiple users and applications; and make sure the information is compatible to different scales and that there is clear information for the user on available geographic information, the way it can be used to address a concrete need and the conditions for acquiring and using it.

To this end, CEI·MAR has sought to enhance oceanographic data platforms, boosting and supporting two initiatives. On the one hand, CEI·MAR's economic support has meant that it has been able to outsource the last production phase for the Electronic Navigation Charts (ENCs) corresponding to Andalusian coastal waters, from the Hydrography Institute of the Navy IHM. This mapping data is directly incorporated into the IDE-IHM GeoPortal by the IHM free of charge. On the other hand, the "Environmental Observatory of the Strait" has become a reality during the period currently evaluated, creating an online service on oceanographic information for the Strait of Gibraltar.

IDE-IHM GeoPortal

The Hydrography Institute of the Navy (IHM) has added the newly launched GeoPortal to its already rich list of organisations which offer oceanographic data to the public under the Spanish Spatial Data Infrastructure (IDEE). This was launched to respond to society's growing need to use geographical nautical information for aims other than navigation itself.

The IHM is in charge of producing the State's official nautical cartography, both digitally and offline. However, the peculiarities of this type

of mapping, mostly due to the continual updates (weekly) and the commitment that it has to security means that it results in a very specific digital product (Electronic Navigational Chart, ENC) which is internationally regulated for its exclusive use in ECDIS consoles (Electronic Chart and Display Information System) on board vessels and protected through a rigid security system which avoids illegal dissemination. Thus, requests for digital nautical information, from society, can not be granted by this product due mostly to two factors: the first is that the IHM should not go outside this security scheme established through international agreements; and the second is that those requesting the information do not have the appropriate consoles capable of «reading» this type of product.

Even so, this IDE-IHM Geoportal offers a series of geographic nautical information services which undoubtedly meet almost automatically many of the requests received so far. It is thanks to the IHM's willingness that services offered on this GeoPortal will be expanded and user contributions will be of incalculable help to its development. The whole catalogue can be consulted at <http://goo.gl/uehPTT>.

Environmental Observatory for the Strait of Gibraltar OMEG

The oceanographic region comprising the Gulf of Cadiz, the Strait of Gibraltar and the Alboran Sea is hugely important not only for the region but also internationally as the Strait of Gibraltar plays an important role in global Atlantic crossing. Its biogeochemical balance is also important as well as the natural and anthropogenic carbon exchanges between the two seas. In this way, the Strait becomes a kind of regulating valve on the scale of oceanographic basins and their monitoring enables us to recognise trends which can be seen on a far greater space-time scale than those of smaller dimensions. In addition, it is widely recognised that the Strait of Gibraltar is important as an area to follow bird migrations and those of marine species such as some cetacean and tuna species. It is a prototype geographical space for implemen-



The OMEG (Environmental Observatory for the Strait of Gibraltar) is an initiative launched by CEI-MAR, established in UMA facilities (photo on the left).

ting environmental monitoring systems and contributing to implementing and following European directives, for example, on water quality, marine strategy and ecosystem protection.

CEI-MAR institution researchers have spent time collecting systematic information on the Strait area. We would like to highlight the following projects: INGRES coordinated by the University of Malaga with the collaboration of the Spanish Institute for Oceanography (IEO); the STOCA project from the IEO which studies temporary sets of oceanographic data from the Gulf of Cadiz; MOCOSEG and MOGAN, UCA projects which monitor surface currents in the Strait; and TRADE, funded by the Regional Cooperation Programme between Spain and Portugal in which State Ports and the UCA participated among others. These projects provide a continual and permanent register of various oceanographic variables in the Strait of Gibraltar region and in the wider area of the Gulf of Cadiz and the Alboran Sea. The UCA, UMA, IEO, IHM, ROA, ICMAN-CSIC, UGR and State Ports are institutions involved and active participants in these projects.

The Environmental Observatory for the Strait of Gibraltar (OMEG) was established in 2014 with the following aims:

- ▶ Be an information repository for scientific work done in the observation area, i.e. the Strait of Gibraltar area including the Alboran Sea and the Gulf of Cadiz.

- ▶ Provide coverage and use to the environmental information systems that the scientific community uses.
- ▶ Foster activities (Study Days, Symposiums etc.) to bring together scientific work conducted in the Observatory's regional area.
- ▶ Following on from documentation and activities, periodically create reports/publications on the study's "status".
- ▶ Propose training and dissemination activities to make the "observation" outcomes known.

The Universities of Malaga and Cadiz are responsible for the coordination of activities even though all **CEI-MAR** institution members participate in the initiative. Other external participants include State Ports, the Spanish Society for communication across the Strait of Gibraltar (SECEG), Maritime Rescue etc. More information including services currently offered can be found on the official website: <http://goo.gl/EQmxYb>

6.- Building the Business Transfer Centre, CTE.

One of **CEI-MAR**'s proposals was to build a Centre for Research and Transfer of Knowledge on the Southern European Sea (CIITMAR). The lack of initial Campus funds made this initiative impossible to approach. However, alternative rou-



tes were sought and since 2013, work has been carried out to redirect the initiative so that it could be financed with Andalusian FEDER funds.

Significant **CEI-MAR** participation and responsibility during the process that defined the RIS3 for Andalusia, commented on in section B.4., made way to participate significantly in establishing the 2020 Andalusia Innovation Strategy, embodied in the Cadiz Integrated Regional Investment (ITI Cadiz). This initiative assumes the concentration of various European structural funds (FEDER, FEADER etc.) to tend to integrated activities in the Cadiz province that are conducive to enhancing economic development and generating employment in a province that has the highest rate of unemployment in Spain. All in all, approximately €1,300M will be directed to central and autonomous administrations in the period 2014-2020, as part of a specific plan to substantially improve wealth, well-being and employment rates.

With these funds, the creation of this research and knowledge transfer centre was planned, focused on the marine sector and to become a European benchmark. This initiative converged with ITI Cadiz's approach, but its aims and objectives needed completely adapting.

Therefore, the **Business Transfer Centre (CTE)** proposal fits into Strategic Area 1 and Thematic Objective 1 (Enhance Research, Technological Development and Innovation); within Investment Priority 1.1 "Improve research and innovation (R+i) facilities and its capacity to develop excellence in R+i subject matter whilst fostering competency centres especially those related to European interest"; and Specific Objective 1.1.2. "Strengthen R+D institutions and create, consolidate and improve scientific and technological infrastructures". This is especially true in its action area: creating, acquiring, consolidating and improving scientific and technological infrastructure and equipment.

A proposal was presented to the Andalusian Regional Government within the framework that

the initiative fits into. The proposal has been approved by the Andalusian government, which has designated a building under their ownership in Cadiz which will become the required centre after complete reformation and adaptation works have taken place.

The Business Transfer Centre is 4,750 metres squared distributed over five floors and an attic above ground and another 2,000 metres squared distributed over two more floors below ground. It will house technologically advanced facilities and services in areas of interest and opportunity for innovative companies in our area.

The centre will be designed in such a way that it will become a reference for transfer and will make organising meetings between businesses and demonstrations to solve concrete problems feasible. Furthermore, the **CTE** will house **CEI-MAR** offices of governance and coordination as well as the Confederation of Entrepreneurs offices of innovation and those to be agreed with CADE (Business Development Support Centre) with the intention of concentrating in the same space all units which can give support, help and advice to set up collaborative innovation projects.

The **CTE** will incorporate the **CEI-MAR** Technical Office and other offices, the transfer units, University of Cadiz European projects and entrepreneurship, Innovation services from the Cadiz Confederation of Entrepreneurs and Innovation Agency of Andalusia offices (IDEA) and Andalucía Emprende (CADE) with the aim of helping stimulate an innovative ecosystem in the Blue Economy field. It will include the following services:

- ▶ **Support and advice service for business innovation and regional development.**
- ▶ **Knowledge transfer and innovation service for companies:** with assistance, knowledge transfer laboratories and pilot plants. The idea is that these spaces will serve innovative companies and establish necessary procedure for companies to be able to use them by hiring equipment or



assistance. It will be possible to start joint entrepreneurial projects. This service will be divided into eight departments:

- ◇ *Virtual Manufacturing. Engineering and Design Technology, Product Development and Simulation and Industrial Processes* Its main focus will be on offering processes directed at manufacturing metallic products and compound materials and on establishing the Virtual Reality in which Factory 2.0 can be simulated and used. This is especially of interest to the shipbuilding and off shore sector. The aim of this department is to make a set of services available to the business sector, based on employing simulation tools proved efficient worldwide, to improve their processes and products. Through this, it would be possible to transfer practical results right from the moment it starts to function.
- ◇ *Non-destructive trials.*
- ◇ *Smart environmental instrumentation and monitoring and industrial processes.*
- ◇ *Additive Manufacturing.*
- ◇ *Advanced Robotics.*
- ◇ *Renewable Marine Energies.*
- ◇ *Molecular Microbiology and Agromarine Foods.*
- ◇ *Microalgae Biotechnology.*
- ▶ **Support service for entrepreneurs:** incubator for EBT and support services. This space will be home to CADE agencies and will be configured as a space that contributes to building an entrepreneurship ecosystem in the Blue Economy field.
- ▶ **General Services:** administrative and technical offices that will attend to requests from companies, meeting rooms, conference halls etc.

The basic project, in its implementation stage, safety and health study, site management and supervision for the Business Transfer Centre in the city of Cadiz went out to tender in the Official State Gazette no. 137, 7 June 2016. This centre will be financed by ITI Cádiz. The total investment amount, including the building, technological equipment and furnishings will be around €9M.



ROLE OF THE PARTICIPANTS

The role of the partnership members in defining the scientific facilities has been vitally important since the partnership came together, participating in setting up their catalogue and adapting them to the marine sector. This theme was worked on in coordination with the research, knowledge transfer and facilities committees. The first milestone reached was the creation of the institute network, distributed across the whole CEI-MAR regional network, representing the partnership's first-class research excellence. This multidisciplinary network, with important international connections, facilitates access to scientific facilities across the whole partnership and enables the referencing of locations in strategic areas for marine-related research.

Another aspect to highlight regarding the coordination of this activity linked to the partnership's members is the commissioning of the UCADIZ. In this case, and at the request of the inter-institutional committee for research, the foundation's board of trustees is responsible for the coordination. They agreed to use a fishing boat that had been seized as an oceanographic vessel, converting it with grants from the Ministry of Infrastructure with the commitment of co-financing from the whole partnership. The ship is now a reality and is having a significant repercussion on the scientific community. The current demand is high and includes researchers from practically all partnership members.



Another aspect that reflects the partnership's involvement in terms of infrastructure, is the agreement signed with the partner universities to make central services available for the use of any member researcher. The agreement was signed by all rectors and its diffusion is evidence of the involvement of all partnership members. This important role is reflected in the existing unique facilities and laboratories in CEI·MAR distributed across the Campus territory and made available to the whole partnership. Placing value on this facilities network, including all partnership members and its use by Campus researchers independent of their location, endorses the coordinated work in terms of facilities. These laboratories include the Marine Classroom (Granada), the Advanced Primary Production Laboratory (Malaga), the Photobiology laboratory (Malaga) and LABI·MAR (Cadiz) among others.

Due to the source of its funding, most of the work of creating the CTE and making it a reality has needed to take place in Cadiz. However, it has worked in collaboration with all of CEI·MAR through the Inter-institutional Committee for Knowledge Transfer.



MOST SIGNIFICANT RESULTS

The most important outcomes are described in the following list.

- ▶ Creating a Research Institutes Network. The last institute to be integrated was the Institute of Marine Research, accredited by the Agency for Quality Assurance of Andalucía and approved by the Andalusian Council of Higher Education in June 2016. <http://bit.ly/2cnppPI>.
- ▶ Placing value on facilities located in central services in CEI·MAR institutions and establishing necessary mechanisms for their shared use among CEI·MAR members. <http://bit.ly/2cBD1H3>.
- ▶ Preparing and submitting the proposal for rehabilitating facilities and putting the UCA-DIZ vessel into operation with the necessary funding so that it could be used as an oceanographic vessel for researchers in areas of Sciences, Engineering and Underwater Archaeology. <http://bit.ly/2c4eQTD>.
- ▶ Agreement with the Cadiz City Council to create the Marine Investigation Laboratory (LABIMAR) in San Sebastián Castle. Remodelling and launching of LABIMAR <http://bit.ly/2cl5F1t>.
- ▶ Placing value on the La Esperanza Saltworks and completing the construction project to build a demonstration tank for microalgae production, making the most of the saltworks canals. <http://bit.ly/2c0UJaq>.
- ▶ Adapting the "Marine Classroom" (Aula del Mar) at the UGR as an expo space where dissemination activities related to marine studies can be held. <http://bit.ly/2celXGx>.
- ▶ Setting up the Photobiology laboratory at the University of Malaga.
- ▶ Setting up the Advance Primary Production laboratory at the University of Malaga. <http://bit.ly/2cekTSU>.
- ▶ Launching the Unmanned Aerial Platform Service <http://bit.ly/2bZIMOr>.
- ▶ Adapting and putting into operation the CA-SEM Aquaculture Plant for marine aquaculture studies. <http://bit.ly/2cMPqMN>.
- ▶ Putting into operation the Geolocation service, Analysis and Historical Heritage Georeferencing.
- ▶ Placing value on and adapting the Inverted Confocal and Fluorescence Microscope System.
- ▶ Putting into operation the IDE Geoportal - Hydrography Institute of the Navy <http://bit.ly/2cgPMIK>.
- ▶ Putting into operation the Environmen-



tal Observatory for the Strait of Gibraltar (OMEG). <http://bit.ly/2cNcHNm>.

- ▶ Implementation of the Business Transfer Centre will begin on 7 June 2016 (Link to news bulletin (<http://goo.gl/46Jiyt>).



INTERNATIONALISATION ACTIVITIES

The main indicator for internationalisation related to this programme is reflected in its capacity to raise the profile of the CEI·MAR institutes network internationally. These institutes, some of which already existed before the Campus was created whilst others were created or initiated during this project, have an international vocation. The considerable mobility among its researchers and the choice that several international researchers make to conduct research stays there, endorses its vocation.

Furthermore, many facilities referred to in this programme have a strong vocation to foster international research. Some examples are: the



MAJOR SETBACKS IN PROGRESS TOWARDS ACHIEVING GOALS

There are no significant setbacks from objectives initially set, although it could be said that these objectives were too ambitious with the funding received, and were therefore unobtainable. The decision, therefore, to apply for external grants and co-finance projects with funds from the partnership has enabled these objectives to be met and even surpassed greatly. It is important to consider that some of the actions initially requested, were ruled out in mid-term evaluations because of the high levels of financing they required. This meant that in the 2013 progress report, the international committee recommended greater investment in facilities. Now, all discarded facilities have been achieved and therefore the initial vision of the CEI·MAR vision has been recovered.

To correct this weakness, we chose to apply for various grants and this has enabled a significant improvement in this section. To represent CEI·MAR project objectives, we should highlight the action of putting into operation the UCADIZ vessel due to the scientific implication that this has. We can also highlight the action of creating the network of research institutions incorporating experimental research areas related to Marine Biology, Geology, Ecology, Oceanography among others such as areas related to Health Sciences and Maritime and Underwater Archaeology. With regards to infrastructure directed at knowledge transfer, we should highlight the specific example of the Business Transfer Centre, a space to foster and enhance business linked to the marine-maritime sector.

requests to use the UCADIZ vessel from researchers from the University of Southern California or Southampton. Within the partnership itself, the University of the Algarve has also requested to use the vessel for studies, such as for the Oceanography master students. In each case, research enhanced through using the UCADIZ vessel should have an international excellence component, and work generated from using it should be published in prominent international journals.

In addition, there are requests from foreign researchers to use the aquaculture plant facilities which have now achieved the necessary accreditation to be referred to as a benchmark facility.

The La Esperanza Saltworks has been visited by foreign ornithologists, mainly British, and has been used for workshops for international students under the Erasmus Intensive Programme.

Finally, LABIMAR has been used by students from the University of the Algarve to carry out practicals classes on marine biology and it is possible that this activity will continue in the coming years.



SECTION B.8. Making laboratories sustainable

Eje Estratégico	Improving Science and Knowledge Transfer
Actuación	Making laboratories sustainable
Objetivos	<i>Objective: Adapt and manage Campus laboratories in a sustainable way.</i>
	CEI-MAR considered this programme in its 2011 proposal, with the aim of evaluating how sustainable its campus laboratories and research centres are. It would also identify appropriate proposals to sustainably renovate scientific Campus buildings and facilities.

INITIAL OBJECTIVES FROM THE 2011 PROPOSAL

The initial objectives from the 2011 report are those referred to in the previous section and so they remain unaltered. The actions carried out are in accordance with those initially anticipated in the Campus of Excellence project.

DESCRIPTION OF WORK ACCOMPLISHED

In its 2011 gathering, the Strengthening subprogramme, associated with the Campus of International Excellence Programme, encouraged the establishment of sustainable laboratories in centres associated to the different Campus of Excellence. Subventions directed at this subprogramme enabled it to evaluate how sustainable its laboratories and research centres are in the selected campuses. It also allowed them to carry out an overall diagnosis in order to achieve sustainable construction in the case of new buildings, and sustainable renovation in the case of already existing facilities, accompanied in both cases by a proposal for sustainable management and laboratory prototype. Together with the subventions granted, the MAITE Foundation (Environment, Innovation and Te-

chnology) would provide consultancy for the selected projects and finance the costs related to developing, implementing and monitoring sustainability indicators for the established improvements.

The MAITE Foundation created the Spanish Network of Sustainable Laboratories (LAB*S) in 2010 as a national work platform to deal with the design, renovation, equipping and management of scientific facilities, developing criteria related to technological, organisational and managerial aspects. As this programme was included in the Strengthening subprogramme as a strategic programme for Campuses of Excellence, the **2011 CEI-MAR REPORT** included a programme which would enable this proposed diagnosis to take place so that various actions could be carried out to make the laboratories sustainable in accordance with each university or institution activities.

In this sense, **CEI-MAR** decided to evaluate the campus laboratories and research centres in terms of their degree of sustainability. It also made an overall diagnosis relating to the proposals for sustainably renovating aforementioned buildings and scientific facilities. Some initiatives have been launched related to implementing renewable energy in **CEI-MAR** buildings. Among these actions, the one that stands out is one of **CEI-MAR**'s unique laboratories, the CA-SEM aquaculture plant. The programme which



is being implemented at the moment consists of putting in place hybrid solar panel systems, located on the roof of the building, and putting in place corresponding pipes to the seawater pump unit (4 floors high). This panel system will provide sustainable energy for the continual use of said seawater collecting pumps, as well as increase its temperature before it is used in aquaculture units which require it (thermocycles and zooplankton cultures).

The inclusion of Sustainable Energy Generation Systems, in this case hybrid solar panels (200m²), improves energy efficiency in the aquaculture facilities. Using solar energy, a sustainable and abundant resource in our area, allows us to considerably lower our high energy usage. It is used for systems that collect and pump seawater from underground wells and which are in continual use in SCI-CM. The proposal also includes gathering seawater that is treated by raising the temperature with the same hybrid solar panels, obtaining both a reduction in the cost, as previously mentioned, and a necessary resource in some of the experimental processes such as fish-farming; the thermocycles for experimentation and reproduction; and also zooplankton cultivation (Rotifers and Artemia).

The use of renewable energy in producing electricity in aquatic plants is a profitable and viable option for any facility. But the possibility of energy self-sufficiency for such a key resource, as is the availability of seawater, would make the SCI-CM a benchmark for Research Centres due to its energy balance in the way it manages sustainable resources instead of traditional ones. This is an area that the Association of Marine Aquaculture Companies in Andalusia (ASEM) is working on with the aim of reducing energy costs and increasing the profitability of its plants.

LED systems have also been installed in two of the algae growth chambers in the CASEM aquaculture plant as well as in the pathogenic unit and in every substituted light in the plant.

A second example of sustainable action can be found on the roof of the School of Economics at the University of Cadiz, where the biggest photovoltaic power plant in a Spanish town centre has been installed (<http://bit.ly/2bXkBzb>).

Finally, another example of sustainability can be found in the Marine Research Laboratory (**LABIMAR**). The location of this laboratory, right next to an intertidal area, allows the most sustainable use possible as it avoids having to transport biological samples to laboratories at the Faculty of Marine Sciences located in Puerto Real. Instead, the samples can be analysed in situ, as the **LABIMAR** laboratory has sufficient equipment for it to function as a true coastal centre. In the same way, it facilitates returning the samples back to their natural habitat after conducting non-destructive analysis.

A second area worked on relates to environmental awareness and organising study days relating to sustainable consumption and saving energy, for example, the different gatherings during the "Act Green" weeks with seminars, workshops and exhibitions on sustainable mobility, responsible consumption, transport, health, environmental legislation, recycling, gender and the environment and the project, "Sustainable University: Green Homes", <http://goo.gl/Ydlr8l>.



ROLE OF THE PARTICIPANTS

Some of the actions referred to were carried out in unique **CEI·MAR** laboratories, as is the case with the CASEM aquaculture plant or **LABIMAR**. Other activities mentioned in the previous section are managed by each laboratory/research group/Faculty or School/University under the coordination of **CEI·MAR** and financed with funds from each institution.





MOST SIGNIFICANT RESULTS

The most significant results are related to putting in place the solar panels in CEI·MAR facilities, such as in the CASEM aquaculture plant or the LABIMAR Laboratory for Marine Research.

Another indirect outcome relates to the universities and CEI·MAR's public research bodies seeking relevant certifications for specific laboratories, aware of the importance that their laboratories and services have in providing outcomes of the highest quality for society in accordance with international standards. By way of example, here are some of the certificates valid for specific university laboratories offering services to the scientific community and services externally:

- ▶ Electrical Metrology and Calibration Laboratory (UCA). Accredited by ENAC: 196/LC10.142 – Calibrations and UNE-EN Standard ISO/IEC 17025:2005 and UNE-EN ISO 9001:2008.
- ▶ Industrial Metrology Centre (UCA). Technology Support Department Accredited by ENAC: 180/LC10.128 – Calibrations.
- ▶ Drinking and Natural Water Laboratory (UCA). Accredited by ECA: UNE-EN-ISO Standard 9001:2008.
- ▶ Tests, Corrosion and Protection Laboratory (UCA). Accredited by ENAC: 436/LE921 and UNEEN-ISO Standard 17025:2000.
- ▶ Acoustics and Vibrations Engineering Laboratory, (UCA). Accredited by ENAC: 231/LE545

- ▶ Aquaculture Service (UCA). Accredited by Bureau Veritas: UNE-EN-ISO 9001:2008; UNE 166002:2006; ISO 140001:2004; UNE 93200:2008.
- ▶ Analytic Chemistry of Polluters Laboratory (UAL). Accredited by AENOR: UNE-EN-ISO 9001:2000.



INTERNATIONALISATION ACTIVITIES

The energetic and definite attainment of sustainability accreditation by the laboratories is a necessary condition for them being included in European networks. This guarantees the international use of the equipment and services offered. It also equates the partnership and their management model with an image of quality.



MAJOR SETBACKS IN PROGRESS TOWARDS ACHIEVING GOALS

Carrying out the initial Programme anticipated in the 2011 Report was dependant on funding from the MAITE Foundation for the Strengthening Subprogramme. The fact that it no longer exists means that CEI·MAR has to look for alternative ways of advancing in making the Campus sustainable and healthy. Despite the lack of funding mentioned, the level of attainment for objectives is acceptable.

C.
Campus Transformation
for Development of an
Integral Social Model



SECTION C.1. CEI-MAR Employability Plan

Eje Estratégico

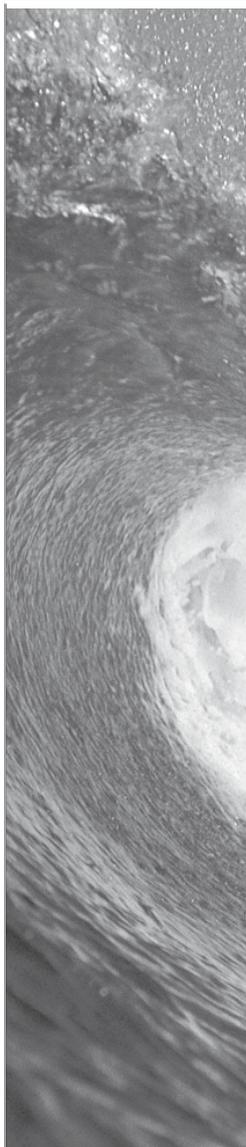
Campus transformation for Development of an Integral Social Model

Actuación

CEI-MAR Employability Plan

Objetivos

Objective: To facilitate students and graduates entry in the labour market and to contribute to the creation of employment in society by promoting innovation and fostering the production model change.



This is the first integrated action on the area of "Campus Transformation". For this purpose, a plan is devised with the **single objective** of making the Campus involved in society and promoting its transformation towards an innovative and balanced space to make **CEI-MAR a reference of social, institutional, business and regional integration**, by promoting knowledge and awareness on marine heritage and its significance in shaping territories and culture.

For this, **CEI-MAR** is born with the intention to be a key instrument for the development of the marine-maritime economy within its geographical scope of action and for the progress of society, fostering and supporting business innovation and regional development. Therefore, the will is to share its knowledge with companies and society and, moreover, as stated on sections B.3. and B.4., to do research in accordance with their needs, to generate new knowledge to give response to society's issues and thus, to contribute to the economic development, the progress of society and, ultimately, to the creation of employment.

At this point, it is necessary to highlight that the enhancing of the inter-relationship between Science-Technology-Business and the creation of an Ecosystem for Innovation, stated on sections B.3. and B.4., make sense based on the commitment **CEI-MAR** has with society and citizens' welfare, which results in the improvement of quality of life, for which employment plays a leading role.

Thus, this action whose objective is to create employment must encompass information and students and graduates employability support programmes. But it has to go further beyond, as the actions have also the objective of fostering and supporting business innovation or promoting entrepreneurship (explained on section B.6.) with indirect effects on job creation.

For all of which, to achieve this objective the following actions are set out:

- ▶ Fostering the production model change and regional development.
- ▶ Information and guidance for employment in the marine-maritime field.
- ▶ Training for employment.

INITIAL OBJECTIVES FROM THE 2011 PROPOSAL

The objective stated on the original 2011 Report was: *"To facilitate student entry in the labour market by improving employment services*

and providing tools that enhance employability and training". For this purpose, actions were implemented according to three areas: creation of a **CEI-MAR** Virtual employment community, Self-employment programme and Programme for graduates' entry in companies.



The current objective is much more ambitious, not only concerning beneficiaries, graduates and the general public, but also concerning the actions taken for such a goal. It is not a change in the objectives but an enlargement of these, adding a wider beneficiary population and a wider range of actions.



DESCRIPTION OF WORK ACCOMPLISHED

The institutions promoting **CEI-MAR**, as they are public entities, have a commitment with the society they serve. The union of these institutions under a joint project in the marine-maritime field served to enhance this commitment, making this marine-specialised union a powerful tool for the production model change and regional development and which constitutes an action area itself within the promotion of employability by **CEI-MAR**. Apart from this, we have been working on information, training, counselling and follow-up for our students and graduates, complying with the action lines of **CEI-MAR** Employability Plan.

1. Fostering the production model change and regional development.

CEI-MAR has become, in less than five years, an essential instrument for the development of the marine-maritime economy in its geographical scope of action and the progress of society, fostering and supporting business innovation and regional development, **becoming a reference for boosting society and the territory, as we intended.**

The **CEI-MAR** commitment with society is integrated with the European Union policy on sustainable growth. The European Commission safeguards the Blue Economy as the necessary incentive for the old continent's economy development. "Growth in the blue economy offers new and innovative ways to help steer the EU out of its current economic crisis. It represents the maritime dimension of the Europe 2020 strategy. It can con-

tribute to the **EU's international competitiveness, resource efficiency, job creation and new sources of growth** whilst safeguarding biodiversity and protecting the marine environment, thus preserving the services that healthy and resilient marine and coastal ecosystems provide"¹.

CEI-MAR means, among other things, specialised and more powerful research, as a result of an inter-institutional alliance closely linked with the business sector and serving society and its citizens. **CEI-MAR** promotes and contributes to a knowledge-based economy able to open new market niches and helping to foster and shake up the traditional ones, resulting in the creation of new jobs with growing qualification and specialisation needs. These are some examples:

- ▶ To build a ship in half the time means to make the shipbuilding industry more competitive at world level and for this, it is required the integration of new technologies and the reorganisation of the production process. If ships built are less pollutant and more energy efficient, our shipyards position in the global market is improved. If we take advantage of the ability of the shipbuilding industry to build jackets or electrical substations for capturing offshore wind energy or sensors for ocean current energy and multi-use ocean platforms or of the use of new building materials in this area of the shipbuilding and offshore industry, all of these represent market niches for the shipbuilding industry accompanied by the technology innovation **CEI-MAR** makes available.
- ▶ Using the energy potential of our seas for testing and developing new technologies aiming at capturing ocean renewable energy to be exported, creates new market niches, fostered by **CEI-MAR**, in the whole of the value chain and boasts a great beacon effect in the region.
- ▶ Being able to load and unload big vessels at the port terminal in record time, to have the port activity, the port itself and the transit of goods control centralised, automatized, interconnected so that instant decisions may be made, on

¹ COM(2012) 494, 13 September 2012, <http://bit.ly/2cgqPuC>



which CEI-MAR is working on, implies to make our ports more competitive and climb up positions in the international ranking.

- ▶ Using new fodder and vaccines in our fish farms and achieving energy optimisation by means of renewable energies and energy efficiency in fish farming, make them more competitive face to international rivals. Applying food technologies for valorisation of processed fish in order to obtain fourth range food products, creating new industrial niches for aquaculture producers, is a task undertaken by CEI-MAR.
- ▶ Applying scientific knowledge on marine environment to the exploitation of endogenous resources of maritime protected areas, such as the salt marshes, helps the sector diversification to new and very different market lines. The use of food technologies for salts fortification also creates new market niches and the commercial innovation will also improve performance in the field of raw salt, both of them in the salt sector. These innovation lines developed by CEI-MAR improve competitiveness and contribute to strengthening the salt sector.
- ▶ Doing research on every type of characteristics of the living marine resources and applying this knowledge to the creation of new drugs, like pain-killers, the obtaining of new foods or the creation of new cosmetic products open new markets for the pharmaceutical, food and cosmetic industries on which CEI-MAR is working on.
- ▶ Applying mobile telecommunications technologies with big data analysis and artificial intelligence optimise strategies and profits of local traders serving tourism. The integration of these technologies to interconnected fields, fostered by CEI-MAR, leads to smart tourism, improving international competitiveness of the sector.

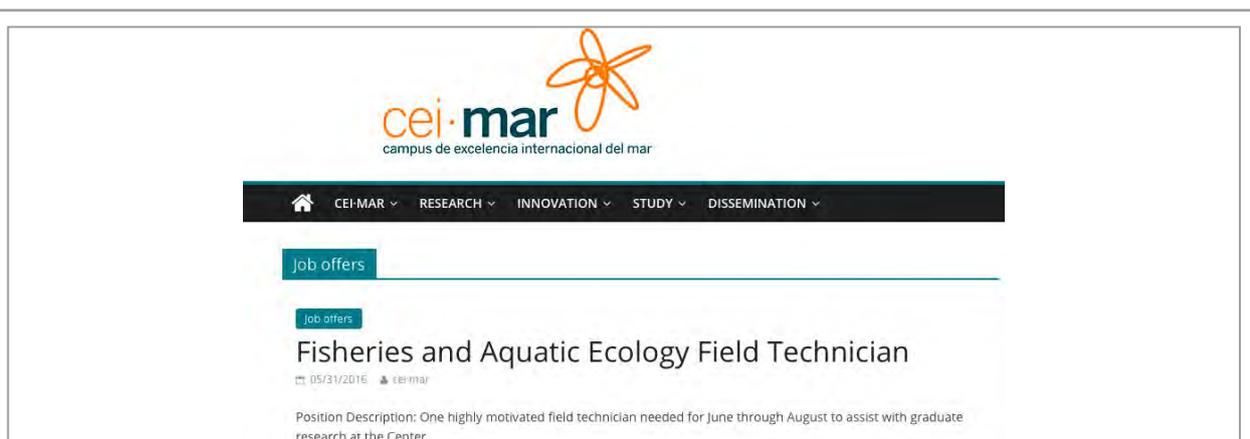
All tips above are just particular cases proving the potential of innovation in the marine field to change the production model, create wealth and qualified jobs and contribute to regional develop-

ment. For this, fostering and enhancing the marine-maritime R&D&i and the commitment with the regional development boasts a cause-effect connection with the production model change and job creation and they constitute themselves action lines within the CEI-MAR Employability Plan.

Given all that and as a consequence of the work on innovation, but also as a social objective, since the beginning, CEI-MAR committed itself to contribute the jobs creation in its geographical scope of action, particularly, that of qualified jobs linked to innovation in the marine-maritime field. This task could be carried out working in close collaboration with companies and all the rest of significant players of the economic development (administration, innovation supporting entities, entrepreneurship supporting entities, technology centres, etc.) under the solution of the Marine Innovation System.

Making knowledge available to society has required strategic programmes already explained on section B, from a strict perspective of their significance for innovation, such as the enhancing of the inter-relationship between Science-Technology-Business, the Ecosystem for Innovation and the creation of an Ecosystem for Entrepreneurship in the marine-maritime field, which could not have been possible without companies' participation and assistance.

Now we are referring to the participation of the business sector from the perspective of its social impact, that is, to the integration of the Campus in society. Hundreds of companies and business associations have joined this CEI-MAR initiative, working together at both formal and informal levels. First of all, it is worth mentioning the commitment of big companies with the CEI-MAR project through their membership in the board of the CEI-MAR Foundation, such as Telefonica, Banco Santander, Cepsa, ENDESA, the Andalusian Business Association, etc. Secondly, it should be highlighted the tens of companies and business entities integrating the *Blue Economy Platform*. Thirdly, it is worth mentioning our membership in different business clusters such as the Shipping



Picture of the employability portal in CEI-MAR website

Maritime Cluster and technology centres. All of this integrates a network of entities committed with CEI-MAR in changing the production model and creating jobs accordingly.

An example of CEI-MAR work within the area of integration with society is the one carried out in the shipbuilding and offshore industries. During the years 2014 and 2015, it was held a busy meeting agenda among the promoting entities of the Shipping Maritime Cluster (CEI-MAR, the IDEA Agency, the Business Association of the province of Cadiz, the Metalwork Business Association of Cadiz and the UGT and CCOO trade unions) until a formalisation of the commitment was achieved for its creation on 19 December, 2014, with the attendance of the President of the Andalusian Regional Government.

Afterwards, they worked at the same time on the work organisation, by signing the articles of association and the incorporation documents of the Cluster as an association on 4 August, 2015; and on the implementation of initiatives. Thus, a "Training Plan for the Shipbuilding Industry" has been developed aimed at requalifying jobs in the industry so that they can be adapted to new technologies and production processes and also a "R&D&i Plan" set out by the Cluster R&D&i Committee.

It was also necessary that actions developed by CEI-MAR were in line with an international and mainly European scope, within the general con-

text for boosting the Blue Economy on the side of the European Commission (EC) and bearing in mind the European R&D&i objectives and strategy, according to the recommendations of the Commission itself on "leveraging synergies across EU policies and instruments to support and develop regional and cross-border maritime clusters"².

CEI-MAR itself makes part of the European vision enunciated by the EC in 2013. Thus, the Business Transfer Centre (CTE), already explained on sections B.4. and B.7. is the response to the need of creating regional and cross-border centres for maritime activities. Also as a response to the need of using synergies among different European programmes and integrate innovation into the international context, the only viable due to the globalisation of the economy, CEI-MAR is becoming involved in European projects and in several European clusters such as: the public-private partnerships in Horizon 2020, BBI, SPIRE and Fof (explained on section B.1.), the international association of the European shipbuilding industry or the involvement in the initiative of a new BG partnership within H2020. They make part of the CEI-MAR partnership strategy and collaborating companies, particularly those integrating the CEI-MAR Foundation board.

Concerning the creation of regional and cross-border centres for maritime activities, it has to be highlighted the important role the CTE has to play. It has 4,750 sqm of building surface, distributed in 5 stories, an attic and two base-

² Report 10 June 2013 on Blue Growth: Enhancing sustainable growth in the EU's marine, maritime transport and tourism sectors. <http://bit.ly/2cm1nn6>



ments accounting for 2,000 sqm, in which advance technology infrastructures and services will be gathered within fields of interest and opportunity for innovative marine-maritime companies of the geographical area of the partnership. This centre will represent a significant contribution to regional development, fostering cooperation, the creation of technology-based companies, promoting small and medium enterprises, so that they have the ability to innovate, create jobs and improve the social and economic development of the region.

In this same area, there is an initiative of constructing the Advanced Manufacturing Centre (CFA), funded by the Integrated Regional Investment (ITI) Cadiz, which will help developing collaborative projects on advance manufacturing within the shipbuilding industry. There is a minimum budgetary envelope for this centre of 15 M Euro and it will be managed the IDEA Agency and counts on NAVANTIA and CEI-MAR as promoting and fostering entities. Nowadays, there are already 6 reports for the first innovation projects with NAVANTIA, which will be launched in January 2017. The CFA will also promote the highly specialised training necessary for the implementation of innovative business initiatives requiring new high-qualified jobs. (Link: <http://bit.ly/2cSV1Ab> and <http://bit.ly/2ckqPeD>).

At the same time, CEI-MAR has significantly contributed to lay the basis for this innovation to have the necessary funding at regional level, among other activities, it was directly involved in the definition of regional innovation strategies, by its participation when stating the regional smart specialisation strategies (RIS3). And so, because this role becomes a need, a demand and a duty in our geographical area. Even at European level, we are referring to two of the least developed regions with high unemployment rates and a production model based on significant ratios in the temporary service sector and, however, with an enormous potential for an innovative marine-maritime production activity.

On section B.4., we have already explained the task CEI-MAR carried out in defining the ANDALUCIA and ALGARVE RIS3 strategies for promoting

the *Blue Economy*. Apart from the achievement of including the Blue Economy in the regional innovation strategies, on the one hand, the work done has led to raise awareness among political authorities to bet on the need of fostering the Blue Economy in our regions and its significance for jobs creation and, on the other hand, this work has had a great social impact.

In the case of Andalusia, the radio, the television and the newspapers talked about the role of CEI-MAR in changing the production model and the regional development. Now and then, there are lots of newspapers mentioning the social potential of CEI-MAR and its commitment with the regional, social and economic development. As an example, it should be highlighted the article on El Pais, 8 December 2013, entitled "Hope is painted in blue" (Link <http://bit.ly/2cOIND2>), which talked about the work done in collaboration with sea-related companies of all sectors and noted this initiative as a hope for Andalusia. On this same article, there were statements by the delegate of the Andalusian Government in Cadiz reporting that: "We want to change the production model to improve it and this is a strategic area. (...) **We can offer new products, create new jobs starting from this good position**".

Our determination was also rewarded by the public recognition made by the President of the Andalusian Regional Government stating that the Blue Economy was of interest for the region. It is stated this way in her intervention before the Andalusian Parliament on 22 January, 2014, when she said: "There are new sectors such as (...) known as the Blue Economy in which Andalusia has to take positions and find new grounds for opportunity that this Government is to explore". (Link: <http://bit.ly/2cFrR47>).

The regional television on the Canal Sur News broadcast informed in these terms: "The Regional Government enhances its bet on the blue economy as an important growth sector for the development of Andalusia. The President of the Andalusian Government, Susana Diaz, highlighted today so during her intervention in the Ex-



The President of the Andalusian Regional Government (left) and the Minister of Agriculture and Sea of Portugal (right) set out in their interventions the need to transform the sea in a space of opportunities for the future

traordinary Meeting held at the Andalusian Parliament to address the situation in Andalusia". (Link: <http://bit.ly/2cnqFkV>).

A similar impact had in Portugal. On 11 February 2015, Assunção Cristas, Minister of Agriculture and Sea, before the rector of the University of Algarve, encouraged universities, companies and other institutions linked to research "to take the most advantage" of the European funds, enhancing that the marine sector has still a lot to move forward, but it needs a strong push to keep developing. She stated that universities are key partners in the effort Portugal was making in order to become established as a leading country in the marine sector. The Minister pointed out that, despite the great job done which needs to be known, to improve the blue economy and, consequently, the Portuguese economy, "there is a need for closer and stronger relationships between the academic world and companies". The Sea 2020 Programme of the Portuguese government includes a policy on economic, social, environmental and regional development, required to support, foster and assure a new national growth period, prioritising exports and employment" (<http://bit.ly/2chkm2I> <http://bit.ly/2ciBgiO>).

2. Information and guidance for employment in the marine-maritime field.

The first information and guidance level is linked to graduate students carrying out external aca-

demical placements. As they are courses within the syllabuses of the corresponding qualifications, they are managed by the business placements units in each university. However, the CEI-MAR degrees' portfolio in essence is under the scope of the Inter-Institutional Teaching Committee, which fosters quality placements clearly linked to the future development of the professional career. This can be guaranteed by the work done by the academic tutors who, at the same time, are CEI-MAR researchers. In this first contact and professional experience, thousands of students from the CEI-MAR universities take part each year.

When it comes to university graduates, we have fostered the integration of graduates into the master's and doctoral studies through two initiatives:

- ▶ Carrying out End of Master Projects (TFM) through work placements following the same tutorship and academic guarantees as a normal TFM, but meeting the innovation needs of the company in which the placement is carried out. This initiative allows, on the one hand, to foster business innovation and, on the other hand, to favour employability of those graduates to be.
- ▶ Carrying out in-company doctoral theses, already explained on section B.3., which apart from being in line with the objective of enhancing the inter-relationship between Science-Technology-Business, favours the employability of young doctors



and their integration into the marine-maritime innovation ecosystem, as highly valued promoting players.

Concerning the undergraduate degree graduates, a specific programme has been established addressing the integration of undergraduate degree graduates into companies, by means of placement contracts, based on preliminary agreements with these companies, established on the Programme. This programme is to be implemented in 2017.

Moreover, guidance programme for employment have been carried out aimed at university and graduate students. Thanks to a by appointment only system, the applicants request a preliminary interview with the guidance staff in which tailor made objectives for user's requests and needs are established (i.e. <http://goo.gl/ZN2he>, <http://www.uca.es/vrteit/practic-as-en-empresas>).

Additionally, in order to convey information on job opportunities in the marine-maritime field, CEI-MAR has considered a virtual space within its website in which all the related information collected out of different sources is published (public calls, private sector offers, noticeboards, etc.). Moreover, this is disseminated on Facebook and Twitter social media (Link: <http://bit.ly/2c-qwdv1>).

3. Training for employment.

For the training for employment aimed at university students and graduates, we act from different and supplementary perspectives.

The first contact with the training for employment arises out of carrying out external academic placements by the university students. As they are courses within the syllabuses of the corresponding qualifications, they are managed by the business placements units in each university. However, the CEI-MAR degrees' portfolio in essence is under the scope of the Inter-Institutional Teaching Committee, which fosters quality placements clearly linked to the future development of the professional career. This can be guaranteed by the work done by the academic tutors who, at the same time, are CEI-MAR researchers.

But, together with this first academic approach, CEI-MAR promotes training in horizontal attitudes and competences for employment, through an specific plan on Training for Employment, promoted by holding specific workshops and business meetings between students and Human Resources managers. This activity can be financed by specific funds granted to universities by the Andalusian Regional Government for promotion of the employment. The main objective is to provide, through a training itinerary, the necessary resources to improve employability of students enrolled in the last year of the degree, representing a supplement of the student's professional competences, acquired during the qualification and syllabus placements.

The specific objectives are:

- ▶ Fostering the learning of personal and social abilities required to increase possibilities of work integration.
- ▶ Guiding students on professional careers offered by the labour market.
- ▶ Favouring competences development.
- ▶ Helping the knowledge of guidance, training and job search resources.

The training activities are focused on: job search skills, training and employment opportunities in Europe, in-company equality policies. 20 courses are held each year.

CEI-MAR is also involved in training programmes on training for positions requiring a specialised technological qualification, in cooperation with technology centres and clusters. Thus, through the Shipping Maritime Cluster, a Training plan for Employment at the Shipbuilding Industry has been set out and funds of the Andalusian Regional Government have been obtained for this purpose. This plan is already being implemented. (Link: <http://bit.ly/2c5D2pX> <http://bit.ly/2clg7o4>).



CEI-MAR launched different initiatives for employability promotion with the participation of companies HR dedicated staff and directors

Other initiatives have also been implemented for the employability in the marine-maritime sector. Given the special conditions of the province of Cadiz concerning the employment, a European project on the promotion of employment in relation to the Blue Economy has been submitted for this province. Cadiz is a maritime province with a 285 km coastline on the Atlantic and the Mediterranean and, for this reason, one of the pillars of the Cadiz economy is based on production sectors linked to the marine and maritime activity. The province's contributions in production, at national and regional levels, concerning the aquaculture, agriculture, fisheries, shipbuilding and offshore industries, maritime transport, port logistics and coast and cruiser tourism, have been fundamentals of the Cadiz economy during the last decades and they are sectors with an enormous potential in the future. In 2011, Cadiz reached a 20,064 billion Euro GDP, contributed to 14.2% of the Andalusian production and boasts a privileged industrial structure and assets concerning the Blue Economy. These industrial structure constitutes a huge potential for the future, which has to be exploited to foster professions in this economic sector.

Despite all of this, the unemployment situation in the province is outrageous. The last Active Population Survey published in April 2016 provides some disturbing results as it places the province's unemployment rate at 37.16% of the active population of Cadiz. This result is far from other Spanish and European regions, in fact, it exceeds the unemployment rate in Andalusia in more than

seven points (29.7%), the average unemployment rate in Spain, in more than 17 points (21.0%) and in more than 27 points the European average (10%). Taking into account the province's industrial assets, the innovative potential and the inter-relationship between Science-Technology-Business, the Business Association of Cadiz, the Shipping Maritime Cluster and the Institute for Employment and Socio-economic and Technological Development of Cadiz, led by CEI-MAR, with the aim of creating efficient tools oriented to solve this serious problem, have drafted the **Diagnosis and Analysis of Capabilities, Theoretical Education and Training, Labour Orientation Actions and Employability of the Blue Economy in the province of Cadiz** (DIANA BLUE) project, submitted for funding to a call for proposals on the 2016 Work Programme within the European Maritime Fisheries Fund (EMFF), managed by the Executive Agency for SME (EASME), whose objectives are:

1. Diagnosis and analysis of training needs.
2. Dissemination and awareness on relevant questions for the Blue Economy to improve visibility and the ability to attract new players or groups to opportunities the Blue Economy sector offers, including awareness actions addressed to primary and secondary education students.
3. Analysis of the syllabus of the Blue Economy university qualifications and those of professional training in the province of Cadiz.



4. Definition, if this is the case, of existing training gaps.
5. Correction of spotted defaults by an improvement proposal.
6. Enhancement of the specialised theoretical-practical training on companies, as a complement of those addressed in university qualifications and professional training in the province, linked to the industry's needs.
7. Provision of a horizontal training for employability in general attitudes and abilities for the employment.

As explained on section B.6., in the field of the Marine Campus of Excellence Network **CEIMAR-NET**, it has been drafted the **EMPLEAMAR** entrepreneurship programme, which may also be considered as a programme fostering self-employment. Even though any programme promoting entrepreneurship could be considered this way, in general, the aims of these programmes are normally the creation of technology-based companies. In this particular case, the **EMPLEAMAR** did include the self-employed workers.



ROLE OF THE PARTNERS

Due to the characteristics of this programme, the load of this action was supported by the universities, the Campus technical coordination and the **CEI-MAR Foundation**. These last two are responsible for doing the necessary coordination. The management of the job offers has been carried out from the partnership technical coordination with the participation of the **CEI-MAR** offices of every partner.



MOST SIGNIFICANT RESULTS

- ▶ **CEI-MAR** has devised and implemented a virtual channel for job offers, within its web, in which information from different sources is gathered to help the access to employment linked to the Campus' topics. (<http://goo.gl/3imzVR>).
- ▶ A Plan on Training for Employment has been devised, addressed to students in their last year of the degree.
- ▶ Labour guidance for students and graduates has been provided.
- ▶ Tens of business meetings between companies Human Resources managers and students have been organised.
- ▶ The carrying out of in-company End of Master Project has been promoted with the aim of favouring the employability in the field of business innovation.
- ▶ An in-company doctoral theses programme has been launched to help employability among young doctors.
- ▶ **CEI-MAR** has participated in the drafting of the Training plan for Employment at the Shipbuilding Industry, implemented by the Shipping Maritime Cluster and financed by the Andalusian Regional Government.
- ▶ Many meetings with companies have been held to help employability. Even some innovation projects have favoured employability within the marine-maritime industries, such as the "Identification of opportunities in the technological and innovation fields for the reindustrialisation of the Bay of Cadiz" project, explained on section B.3., in which twenty researchers of the **CEI-MAR** partnership took part. This project defined technology innovation opportunities to convey in new business areas or to improve the existing ones in the field of the exploitation of natural resources in marshlands and ponds, with a great impact in qualified staff in the marine sector job creation.
- ▶ We take part in clusters and technology centres (already stated on section B.3.) fa-



vouring relations with the business sector and allowing employability actions.

- ▶ In connection to the Enhancing the inter-relationship between Science-Technology-Business Programme (section B.3.), CEI-MAR has organised a great number of sectoral meetings with companies, technology centres and administrations with the aim of enhancing relations and help a closer contact of students and graduates with these institutions.
- ▶ Especially, during the Symposiums on Knowledge Transfer in the Marine Context (mentioned on section B.3.), held at the University of Huelva, the lecture on "The Blue Economy, CEI-MAR: a sea of opportunities" was delivered. It put forward knowledge transfer as being a very valuable tool for consolidating employment associated to the marine field.
- ▶ The Blue Economy concept linked to CEI-MAR sets up a reference in the Regional Government and the Andalusian society as they promote economy, transfer and employment.
- ▶ The University-Business-Society Connection Programme (section B.6.) on entrepreneurship also sets out actions for self-employment.
- ▶ The Employment Programme for undergraduate degree graduates.

- ▶ The Employability Programme in the field of the Blue Economy, DIANA BLUE, has been drafted for the province of Cadiz, submitted for European funding.
- ▶ The CEIMARNET network has participated in the drafting of the proposal of the EM-PLEAMAR project, which will be submitted to the calls for proposals of the Biodiversity Foundation.



INTERNATIONALISATION ACTIVITIES

CEI-MAR keeps a permanent and strong connection with graduates' associations and groups from different faculties and schools, which provide a very relevant information on jobs and employability, not only at national level but also at international level. Thanks to their involvement, it should be highlighted the specialised international mailing lists such as MARINET (displaying a great offer both in Europe and America), those on international projects such as EUROMARINE+, of which CEI-MAR is a member (<http://goo.gl/LUmtjg>), as well as the graduates in marine studies groups such as those of the University of Cadiz, managing and coordinating all the information on the address planificacion.mar-amb@uca.es.



CEI-MAR bet on knowledge transfer as a tool for improving employability



CEIMARNET carried out the EM-PLEAMAR project for improving employability



MAJOR SETBACKS BETWEEN INITIAL OBJECTIVES AND RESULTS

The objective stated on the Initial Report has been accomplished. In some cases, aiming at a wider scope concerning the beneficiary population. That is the case of the Training plan for Employment at the Shipbuilding Industry, implemented by the Shipping Maritime Cluster. The programme addressed to masters' students has registered a high demand and a better reception than expected on the side of companies. Other initiatives have been fully accomplished, such as the job offers action. However, some fostering, supporting and training programmes already devised, have not been launched yet. They are the most complex programmes either by their legal compliance or the wide range of potential beneficiaries. This is the case for the Employability Programme for undergraduate degree graduates (to be launched in 2017) or the DIANA BLUE project, submitted for European funding. In general, the programme has been adequately developed.



SECTION C.2. CEI-MAR Society Interaction Programme

Strategic area	Campus Transformation for Development of an Integral Social Model
Programme	CEI-MAR – Society Interaction Programme
Objectives	<p>Objetivo General: Promover el conocimiento y la concienciación sobre el patrimonio del mar y su importancia en la configuración de los territorios a la sociedad.</p> <p>This action aims to disseminate all values, strengths and knowledge of the CEI-MAR partnership within society by means of scientific dissemination activities. This objective was reviewed and detailed through the development of the project, giving the following actions as a result:</p> <ul style="list-style-type: none"> ▶ Creation, consolidation and coordination of the Scientific Culture and Innovation Units (UCC+i) at CEI-MAR institutions. ▶ Creation, development and strengthening of CEI-MAR marine laboratories and infrastructures with the aim of being centres of reference in dissemination of marine knowledge. ▶ CEI-MAR scientific dissemination activities. ▶ CEI-MAR exhibitions. ▶ CEI-MAR dissemination platforms. ▶ CEI-MAR audiovisuals. ▶ Proposal for the creation of a laboratory - museum of Marine Archaeology and Maritime History. ▶ Participation of CEI-MAR in the Tall Ships Race 2016 in Cadiz. <p>The Scientific Culture and Innovation Units (UCC+i), which in previous reports were included in section B.5., has been moved to this section C.2., as the most of their activities are oriented to citizens and society. Activities on scientific dissemination of research aimed at the academic and research community are still included in section B.5. Moreover, the creation of singular marine infrastructures (Labimar, "Aula del Mar", "La Esperanza" salt marshes, OMEG) are included in section B.7.</p>



INITIAL OBJECTIVES FROM THE 2011 PROPOSAL

To achieve this objective, on the **CEI-MAR 2011 REPORT**, four specific actions were set out:

- ▶ The Marine Cultural Resources Centre, including the "Window on the Sea" programme to disseminate scientific activities at the Campus and propose courses, exhibitions, competitions and activities for the society.
- ▶ The "Ogenus" Experience Room as a virtual space for interaction among researchers.

- ▶ Museums of the Sea, to boost museum material and exhibition spaces at **CEI-MAR** institutions.
- ▶ Promotion of sports/health/sea activities, to foster sports and nautical activities.

This last paragraph related to sport and health is the only one not being included in the reviewed objectives on this section. The reason being these activities are explained in detail on other sections: the sport-related issues (mainly nautical sports) are included on section C.3. The field of "health and sea" has been recognised at **CEI-MAR**

C.2. CEI-MAR SOCIETY INTERACTION PROGRAMME



as a specialisation area, which has been added to the 5 specialisation areas set out at the origins of the Campus of Excellence (section B.1.).



DESCRIPTION OF WORK ACCOMPLISHED

The CEI-MAR Society Interaction Programme is one of the most active at CEI-MAR, as from the Coordination and the offices at the Campus of Excellence, a great effort is being made to convey the spirit of the Campus and CEI-MAR institutions to the local population.

Scientific dissemination and design of new formats to bring the activities of the universities and Public Research Institutions (PRIs) closer to society have gained a great significance within the activities of these institutions both at national and international levels. Nowadays, bringing closer to society the activities carried out by researchers at their work centres has become a need, showing the general public not only the achievements in both basic and applied research, but also showing how their daily lives are, as well as the environment they work in. The goal is not only to attract new vocations among the youngest, but also to show the general public where public investments for research are made.

In order to boost this programme, the following action plan was set out:

1. Creation, consolidation and coordination of the Scientific Culture and Innovation Units (UCC+i) at CEI-MAR institutions.
2. Creation, development and strengthening of CEI-MAR marine laboratories and infrastructures with the aim of being centres of reference in dissemination of marine knowledge.
3. Development of CEI-MAR scientific dissemination activities.
4. Development of CEI-MAR scientific dissemination exhibitions.

5. CEI-MAR dissemination platforms.

6. CEI-MAR audiovisuals.

7. Proposal for the creation of a laboratory - museum of Marine Archaeology and Maritime History.

8. Participation of CEI-MAR in the Tall Ships Race 2016 in Cadiz.

The aspect of scientific dissemination of projects outcomes and research agreements to a more academic and scientific environment is more linked to the strategic area "Scientific and Transfer Improvement" set out on section B.5.

1.- Creation, consolidation and coordination of Units (UCC+i) at CEI-MAR institutions.

The Scientific Culture and Innovation Units (UCC+i) represent a key service to improve and increase scientific training, culture and knowledge among citizens. Thus, the great majority of the CEI-MAR institutions counts nowadays on their own UCC+i. In the whole CEI-MAR partnership, the creation of UCC+i units to cover scientific dissemination has been a priority for all the governing teams. Once this unit approved, the implementation of scientific dissemination activities on marine or coastal topics has been constant with the aim of making the Campus and its activities visible to the whole region by generating activities, competitions, exhibitions, etc.

The whole of the Campus units work in a coordinated way on different, very relevant scientific dissemination projects. The main activities of the Scientific Culture Unit are set out on the web page: <http://goo.gl/I4o7xL>. As a good example of this, it should be highlighted, at European level, the nowadays established "European Researchers' Night", funded as European projects, within the Marie Skłodowska-Curie actions in the Excellent Science pillar on HORIZON 2020. It is held at the 5 CEI-MAR Andalusian universities involving the active participation of researchers of these uni-



CEI-MAR scientists participate in dissemination activities during the European Researchers Night, included among the actions on the Horizon 2020 programme

versities, including in the activities, those coming from the PRIs making part of the **CEI-MAR** consortium (<http://goo.gl/jeBM20>; <http://goo.gl/yIQ22z>).

The scientific culture units from different universities which make up the partnership are:

- ▶ Scientific Culture and Innovation Unit - University of Almeria: <http://goo.gl/J3FZu1>.
- ▶ Scientific Culture and Innovation Unit - University of Cadiz <https://goo.gl/KNCXDm>
- ▶ Scientific Culture and Innovation Unit - University of Granada <http://goo.gl/kFVTj8> .
- ▶ Scientific Culture and Innovation Unit - University of Huelva <http://goo.gl/QDjCTe> .
- ▶ Scientific Culture and Innovation Unit - University of Malaga <http://goo.gl/4UCLNz> .

At the first stage of the **CEI-MAR** project, the coordinating university took the initiative and developed a visibility strategy and a Dissemination Plan of the Campus aimed at its community and society. To achieve the objective, they have been working on conveying the Campus concept and the strategic actions to be carried out during the period 2011-16 to the participating institutions. This stage was developed during the first months of the Campus, mainly by information talks, lectures and meetings with different groups.

This task was mainly carried out by scientific and technical coordinators of the Campus and it was

focused on the university community and the PRIs. Later on, this unit together with the UCC+i and/or the Communication Departments of the **CEI-MAR** universities have created the "Inter-institutional Committee for Communication and Dissemination". In July 2013, the first meeting was held with the aim of carrying out coordinated dissemination actions, so that **CEI-MAR** itself could apply for public calls to obtain funds for scientific dissemination.

At the final stage when the **CEI-MAR** Foundation was already consolidated, a part of the dissemination and interaction activities have been assumed by this, so that they could also be helpful for the Foundation promotion. In 2013, the UCC+i submitted a project on scientific dissemination for the FECYT call for proposals, including a full dissemination activities programme. The FECYT decided to formally and financially back the activities proposal submitted for the 2013/2014 academic year. On the applications both researchers from the universities and from the PRIs were included, which, for the first time, gave the chance to apply for this type of aids and allowed their successful inclusion in numerous activities. For these last 3 years, three projects on this kind of activities have been won within the strengthening call for proposals. Finally, to these projects it has to be added, during the last year, the conclusion of the organisation of the Summer Scientific Campus, a great success bearing in mind that it was the first time **CEI-MAR** was allowed to participate in this call (see section B.5.).



After the transfer from the Local Council of Cadiz to CEI-MAR in June 2014 (left picture), the LABIMAR, once restored, was inaugurated in January 2015 (right picture)

2.- Creation, development and strengthening of scientific dissemination laboratories and infrastructures: LABIMAR in Cadiz, Aula del Mar in Granada, "La Esperanza" salt marshes in Cadiz and OMEG in Malaga.

Marine Research Laboratory (LABIMAR).

The **LABIMAR** arises out of an agreement with the Local Council of Cadiz and **CEI-MAR** (<http://bit.ly/2c4tDAy>) funds its organisation. The objective of **LABIMAR**, located in a symbolic and strategic place is triple: an infrastructure for teaching, reasearch and dissemination of knowledge on the sea to society (<http://bit.ly/1UvT3mB>).

The San Sebastian castle offers a unique location for sheltering this qualified research and training laboratory, not only for representing a piece of significant heritage of the city of Cadiz, with a relevant historical value (being part of the defence system of the city of Cadiz) and cultural value (very appreciated by the Cadiz population, due to its strategic location in front of the La Caleta beach); but also for displaying unique conditions for research in intertidal areas.

In this period, numerous activities have been carried out, all of them have been published on the **LABIMAR** Facebook page (<http://goo.gl/QLWRNB>).

★ Teaching activities:

The existence of **LABIMAR** as a laboratory on the coastline has allowed, during the two last academic years (2014-15 and 2015-16), the development of teaching practices in the qualifications of Marine Sciences and Environmental Sciences (Marine Zoology, Marine Botany, Ecology, Methods in Oceanography), as well as practices in the Masters of Oceanography. This centre has been open to the partnership, taking advantage of the potential of the laboratory and its location. Thus, groups of students from the qualification in Biology of the UGR and undergraduate degree students from the University of Algarve have visited the laboratory (<http://goo.gl/wVWk4P>). It has also been the headquarters for carrying out several end of grade and masters' projects.

Moreover, **LABIMAR** has been the seat of summer courses of excellence and doctorate courses by the **EIDEMAR** Doctoral School:

- ▶ 2nd **CEI-MAR** International Summer School. *Aquaculture in Southern Europe: Basic and applied aspects* (<http://bit.ly/2cuPRYP>).
- ▶ 2nd **CEI-MAR** International Summer School. *The amazing world of seaweeds: An unforgettable journey from biology to gastronomy* (<http://bit.ly/2cyRALA>; <http://bit.ly/2cKDknj>).
- ▶ *Use of stable isotopes in Marine Ecology* (<http://bit.ly/2cq8YF8>).



Air view of the San Sebastian Castle, seat of LABIMAR, and its surroundings in ebb tide

★ **Research activities.**

The **LABIMAR** also constitutes a research centre. At their premises, several **CEI·MAR** groups working on Marine Biology have been doing research on flora and fauna of the coast of Cadiz. On this research, there are nowadays several scientific articles at the revision stage in international magazines (see section B.7.).

★ **Scientific dissemination activities:**

The main strength of **LABIMAR**, however, is being an infrastructure for scientific dissemination and training on the Campus' values with a wide range of target public, from scholars to secondary education students, university students and the general public.

For this purpose, the dissemination and exhibitions room, displaying a permanent **CEI·MAR** exhibition, as well as a looping video projection system, a 1000 l aquarium and a phytoplankton culture system, is open in the same opening hours of the San Sebastian castle from Monday to Sunday. Every day, many people, both Cadiz locals and tourists, with a great attendance of cruisers, visit **LABIMAR** (reaching several hundreds on weekends).

During this period, some series of lectures have been organised such as Invescerca, (2015 and 2016 editions, <http://bit.ly/2bXdLtf>), the 3rd Seminar on Marine History and Heritage, (<http://bit.ly/2cyRVhn>), or the Study Days on Historical, Cultural and Natural Heritage of La Caleta (2015 and 2016

editions) (<http://bit.ly/2coHUXW>), which were a great success in terms of public, mostly citizens, and had a great impact on local media.

Different workshops open to the public have been carried out such as the one on the "Recognition of algae and elaboration of herbarium" (<http://bit.ly/2c32Gu2>) or the workshop "Marine algae and seagrasses" for students of the Older Adults Classroom of the University of Cadiz.

In its two editions 2015 and 2016, the Sea Scientific Fair has given the opportunity to show **CEI·MAR** to society in the surroundings of the San Sebastian castle, by promoting workshops and activities related to the sea. These sea scientific fairs were a great success in terms of attendance and of a great local impact. (<http://bit.ly/2b-YC3rF>; <http://bit.ly/1TEFJZn>; <http://bit.ly/25b-PVnF>; <http://bit.ly/2ciEqEM>).

The 2016 **CEI·MAR** scientific Summer Camp, which is fully explained on section B.5., has registered 120 students throughout the month of July. 4 workshops have been devised with a strong link to the knowledge of the marine environment and to paramount **CEI·MAR** and the University of Cadiz infrastructures. It should be highlighted one of the first activities of the UCADIZ oceanographic vessel, which has recently been presented and constituted one of the four topics of the activity (Oceanography workshop). (<http://bit.ly/2c4w-Fo2>). Back in 2015, workshops on environmental education were already held for 50 children from the Cadiz city camps.



Since the opening, the LABIMAR held a busy agenda of scientific dissemination actions.
Poster of the 2nd Seminar on Historical Heritage

The **LABIMAR** has also been a seat for temporary exhibitions, plus the permanent one displayed in the dissemination room. Exhibitions such as the one on "The Manantial Beach and its fauna 5 million years ago", first exhibited on the beaches of El Puerto de Santa Maria, and "Sea monsters". (See paragraph 4 on exhibitions for further details).

The star attraction of **LABIMAR**, representing the conveyance of marine education values to society, has been "The School goes to the (LABI)Mar". Focused on early childhood, primary, secondary and baccalaureate students, this one hour and half-duration workshop consisted in a tour for the premises, followed by a short explanatory talk on the base of the permanent exhibition of the dissemination room. Then, the laboratory was visited and, at this point, a presentation on La Caleta biodiversity was made, followed by a workshop on algae and marine organisms' identification or extraction of pigments, among other activities, adapted to the ages of the students (stories for the little ones on

environmental education on the sea, for example). (<http://bit.ly/2ciDLTF>; <http://bit.ly/2ciDYXb>).

From February to June 2016, the **LABIMAR** has welcomed a total of 65 groups of scholars of the city of Cadiz and the province (mainly towns nearby the Bay: Puerto Real, San Fernando, Puerto de Santa Maria, Jerez) accounting for more than 1,700 students of different ages, from 4 to 18 years old. To these students, they have to be added those from the 2016 edition of the Spring Call for Proposals of the Scientific, Artistic and Literary Routes by the Ministry of Education, Culture and Sport. Every Thursday of May, the workshops were held for students from different high schools in Spain, including Jaen, Palencia, Madrid or Ceuta. A total of 200 students increasing the activity of these workshops to almost 2,000 the participants.

★ "Aula del Mar", Granada.

The Marine Classroom in Granada represents the supporting entity for teaching and research for



Since the opening, the LABIMAR held a busy agenda of scientific dissemination actions



Biological material collection activities and latter study under the microscope at the LABIMAR

undergraduate postgraduate degrees in subjects related to the specialisation areas acknowledged as topics of study at CEI-MAR.

The Marine Classroom is a real and virtual classroom in which both science and dissemination on sea knowledge share the leading role. On the one hand, the real classroom is fitted with a laboratory with an experimentation installation for water organisms, both vertebrates and invertebrates and vegetables. It has a gas supply system and water re-circulation systems to keep the organisms under study in the optimal conditions.

Another of its key missions is to bring the scientific activity of the University of Granada researchers working on some of the fields covered by CEI-MAR closer to society. Therefore, the organisation and promotion of a series of specialised conferences, seminars and talks represent other usual activity. Moreover, it displays a range of exhibitions tanks in which some of the most repre-

sentative marine species of the coast of Granada are shown.

It is located at the Faculty of Sciences of the University of Granada and, apart from the afore-mentioned laboratories, it has several classrooms in which courses and seminars are delivered and fully-equipped hands-on laboratories. The entrance hall of the Marine Classroom has been arranged to make presentations and temporary exhibitions. All these premises help the teaching and dissemination task of the Marine Classroom for the students of the University of Granada themselves and for other groups of students linked or not with education institutions.

From its virtual format, it develops a significant dissemination task, keeping a close contact with society by means of the social media and the use of new technologies. The Marine Classroom manages several accounts in the main social media such as Facebook and Twitter and its own web-



The LABIMAR undertook a task on sea knowledge dissemination among the little ones. Among these, "the school goes to LABIMAR"



Activities such as the "marine scientific fair" or the environmental education workshops in saltworks mean the CEI-MAR is called for dissemination

site, in which topics of interest are constantly uploaded, not only addressed to university students, but also to other groups in all the fields related to the sea, the science, the tourism, the fisheries and aquaculture industries and so on.

The Marine Classroom has carried out dissemination and training activities such as the series of conferences "The knowledge of the sea", a series of marine documentaries, a workshop on photography in tanks and the 1st Course in Aquarium techniques. The Marine Classroom has a key significance, together with the **LABIMAR**, as reference laboratories within the "Sea Watchers" project in the Andalusian waters. Its activity is uploaded on Facebook: <http://bit.ly/2coJ99G>.

★ **"Nuestra Señora de la Esperanza" saltworks.**

When developing the **CEI-MAR** project, different actions have been implemented in order to restore traditional saltworks, facing the loss of cultural, economic and environmental values that the abandonment of these premises is causing in the Atlantic arch (Huelva and Cadiz), as well as in some Mediterranean areas (Almeria). Among the objectives of these actions, it is remarkable the improvement of the biological interest of the areas, its restoration and exploitation, to arrange and structure the salt worker profession, the recognition and revalorisation of the traditional salt, the valorisation of tourism and the spatial approach for developing a comprehensive management.

In this sense and as it was already explained on section B.7. on **CEI-MAR** infrastructures, the partnership is the holder of the concession of the "La Esperanza" salt marshes, granted by the General Direction of Prevention, Environmental Quality and Climate Change of the Regional Ministry of Agriculture, Fisheries and Environment. This concession was granted for the execution of the project "Sustainable and comprehensive management of the "La Esperanza" salt marshes, including among other activities, the exploitation of traditional salt, salt flower, environmental and eco-tourism activities and research and biodiversity preservation activities.

In addition to the restoration activities, numerous activities are being carried out at the "La Esperanza" salt marshes, such as research projects, doctoral theses, birds' follow-up, sampling of macro and micro-invertebrates, actions of management and restoration of the salt marshes, work fields, volunteering, dissemination actions, revalorisation of cultural, economic and environmental values of the salt marshes.

★ **Environmental Observatory of the Strait of Gibraltar (OMEG).**

The Strait of Gibraltar is a unique location on the planet, as the Atlantic and the Mediterranean merge in and it is a migration area between two continents, Europe and Africa, which make of this an area rich in biodiversity. In the regional framework of **CEI-MAR**, one key objective was to



have an Environmental Observatory in which all the information from and generated by CEI·MAR institutions on the area of the Strait of Gibraltar would be systematically collected. The majority of CEI·MAR institutions (UCA, UMA, IEO, IHM, ROA, ICMAN-CSIC, UGR, Ports of the State) are involved in this action and they are active players.

The OMEG is a permanent and updated system (web platform) containing scattered information. It is an entity gathering and providing information on the Strait of Gibraltar not only to the scientific community, but also to citizens, professionals and administrations (<http://omeg.uma.es/>).

3.- Scientific dissemination activities.

The universities and institutions making up CEI·MAR in coordination with the UCC+i have actively participated in scientific dissemination. During the period 2011-16, the partners have developed a great number of activities with a great success in terms of participation. On this paragraph, they are included the dissemination activities on marine laboratories, not stated above on paragraph 2.

Coffee with science

An initiative coordinated by the Descubre Foundation, in cooperation with the main research and dissemination entities in Andalusia. This initiative is funded by the FECYT and sponsored by the Regional Ministry of Economy, Innovation, Science and Employment of the Andalusian Regional Government with the aim of bringing examples of scientific excellence from the university and research entities and CEI·MAR closer, in a friendly way and adapted to high school students who are about to begin university studies in the following years (<http://bit.ly/2c4w1qF>). This activity has been carried out in every CEI·MAR University.

The significance of knowing how to communicate and disseminate science

The main goal of the course was to raise awareness on the need and duty we have, as members of a public service institution, to let the society

know the outcomes of research works carried out at the University, mainly through the media. For this, scientific experts in dissemination and journalists participated for exchanging experiences and analysing the actual existing difficulties to communicate science in the middle of a crisis, in addition to teach the key questions to develop a more effective communication. Thus, in this meeting, they talked about the significance of scientific dissemination for public universities and analysed the key questions for an effective dissemination reaching the society (<http://bit.ly/2ceFRTG>).

Science in the Street

Study days organised in cooperation with the Descubre Foundation and the Local Council of Jerez de la Frontera. Open day to visitors and scholars (<http://bit.ly/2ceFkkG>). It was held in the squares of this city in order to bring science closer to all citizens by means of everyday life examples and demonstrations.

Researchers on route

Activity aiming at bringing the most distant society closer to the university environment, that located in towns far away from the university buildings, science and research carried out at academic premises, which one way or another has an impact on their environment (<http://bit.ly/2cyTDz3>).

Science at school

Talks by researchers in schools and high schools on different research carried out in the framework of the Campus of Excellence (<http://bit.ly/2coIS6p>).

Seasonal courses

Seminar of Excellence on Agrifood Diversification out of Wine and Sea. Among the food products of the Antiquity, the garum is doubtless the most puzzling. Invented and popularised by the Romans out of antique recipes and practices, it is obvious its use in gastronomy and paleo diet in the Ancient World, as a product itself and as



CEI-MAR participated with children workshops and micro scientific meetings in the last 4 "Researches Night" editions

a condiment, with multiple nutritional and therapeutic properties (<http://bit.ly/2colt3Z>).

Researchers Night

It is an event held in more than 350 cities in 32 European countries and promoted by the European Commission (<http://bit.ly/1tngDpO>), which takes place every autumn (<http://bit.ly/1fJL9W7>).

In the case of the CEI-MAR environment, this event is held in every Andalusian province participating in this Campus, in which every University and PRI are involved (<http://bit.ly/1KD-N5Zo>). Its main goal was to bring science and, specially, scientists closer to society for them to explain citizens, in a friendly, direct and simple way, different issues related to the work they do in laboratories and on which they intend to build a better world. It is remarkable that in the first edition, in September 2013, high rates of participation were achieved (<http://bit.ly/2cyT74q>). A success which consolidated in the following

editions, as it was proved during the last one held in 2015. This event has become a meeting point between Science and society, having an extraordinary acceptance and recognition (<http://bit.ly/2caXd3j>). At the University of Huelva, for example, during the Researchers Night, numerous activities were carried out, including workshops such as:

"Micro-algae: a sea of applications", "The marine biodiversity", "The Marshlands: a threatened amphibious ecosystem" or micro talks such as "Ecological treatment of acid mine drainage", among others. In this edition an impact reaching around 4,000 people was achieved with the participation of more than 50 men and women researchers.

Within the "Week of the Marine Sciences" programme, CEI-MAR has fostered photo and micro stories contests open to the general public in which the sea is the core topic. The planning of these activities comes to join the rest of the ac-



CEI-MAR has worked in the field of sustainability. Picture of the course for beginners on environmental education in littoral areas of Huelva



tivities held in the traditional "Week of Sciences". Participation is fostered through the social media of the Campus. On the date of issue of this report, two editions of photo and micro stories contests have been concluded.

Gastronomy of Excellence Days

With the aim of promoting the Campus of Excellence in the university community and the attendees and disseminate the gastronomical wealth of the province of Cadiz, the UCA held the 1st Gastronomy of Excellence Days of the University of Cadiz "A look from the Bicentennial" (<http://bit.ly/2c4vT11>).

3rd A pinch of salt project

Aimed at the university community and other groups. The goal of the project was to valorise and restore the traditional salt marshes (<http://goo.gl/7Y2yoJ>, <http://goo.gl/7bdnPL>).

Course for Beginners on Environmental Education in Coastal Areas of Huelva "Environmental Education in front of the Sea". <http://bit.ly/2caYR4I>.

Graffiti competition at "The Sea" University

Organised by the Sustainability Classroom at the UHU in cooperation with the Leon Ortega School of Art. It is a contest where participants had to make graffiti of marine thematic in 14 panels scattered around the campus.

Conference "The marine resources in the coast of Huelva"

CEI-MAR was the institution in charge of coordinating the meeting, which was opened by the Manager of the CEI-MAR Foundation with the conference "The marine resources in Andalusia". The coast of Huelva was analysed by professor Adolfo Muñoz, member of the Marshlands and Beaches research group, who made the introduction of presentations of works on topics such as the salt marshes, micro-algae, legislation and carried out by other research groups of the University of Huelva attached to CEI-MAR.

Course on Natural Heritage of the Coast of Huelva

(<http://bit.ly/2cfrqvw>).

Cultural Week of the Experience Room.

Day of the wetlands in La Rocina and El Alcebron (natural site of Doñana).

7th Symposium on updates of Administrative Law: "Coasts and Urban planning: science and new Case Law" in Almeria

Training Network course "Coastal aquifers and marine intrusion: principles, mathematical simulation and processes identification" in Almeria. (<http://bit.ly/2bYCO4h>).



Poster of the graffiti contest at "The Sea" University

4.- CEI-MAR Exhibitions

The exhibitions have had a clear objective in disseminating knowledge on the sea among society. These exhibitions, which have been itinerant in several locations, have a significant dissemination role, not without scientific accuracy. The Maspalomas exhibition and its series of conferences, gathering the outcomes of one of the major oceanographic projects in the 21st century at world level, in which several CEI-MAR partners took part, is explained on section B.5., as it prioritises scientific dissemination among the researchers' community and not the general public.

The exhibitions made have been:

- ▶ *Science in Comic*, exhibition organised by the UCC+i in which 16 European research projects are depicted using the comic graphical technique (<http://bit.ly/2ceH8u4>).
- ▶ *The Manantial Beach and its fauna 5 million years ago*, first exhibited on the beaches of El Puerto de Santa Maria in the summer 2015 and, after that, at the **Labimar** (<http://bit.ly/2bYDCFZ>).
- ▶ *Sea monsters*.
- ▶ Exhibited in different locations such as the School of Philosophy and Arts, the **Labimar** and recently during the Tall Ships Race Cadiz 2016 (<http://bit.ly/2cJcCKW>; <http://bit.ly/2cqc1Ni>).

- ▶ *The Secrets of the Antarctica*.
- ▶ Exhibited in the School of Sciences and recently at the Tall Ships Race Cadiz (<http://bit.ly/2cyUboP>).
- ▶ Exhibition *The marshlands: a threatened amphibious ecosystem*, held in Huelva (<http://bit.ly/2ceGixE>).
- ▶ Moreover, the Campus has participated in several exhibitions, the most remarkable being those held in the Archaeological Ensemble of Baelo Claudia (Tarifa, Cadiz), one of the most visited sites in Andalusia, with around 150,000 visitors per year. Specifically, in the one entitled "The Art of Fishing: Phoenician and Roman origins of Andalusian fishing techniques" and recently in "From Baelo Claudia's garum to Tarifa's frigate tuna".
- ▶ In the framework of the Tall Ships Race Cadiz 2016, organised by the Local Council of Cadiz, in which **CEI-MAR** showed a notable presence with 5 tents, several exhibitions by **CEI-MAR** partners (UCA, CSIC, IHM, IEO, CAS) and collaborating entities such as the Natural Park of the Bay of Cadiz were presented, as well as a new brand exhibition entitled "The University of Cadiz, the University of the Sea" (see details on paragraph 8)..



5.- CEI·MAR dissemination platforms.

The Campus has an official portal in which the information on the Campus project is gathered (strategic project, areas for improvement, partnership, community, ongoing actions, calls for proposals, etc.). This portal is continually updated to reflect the Campus needs. During the last year, the portal has been modified to make it more dynamic, not so focused on the project but on the achievements, news and calls for proposals (<http://www.campusdelmar.com>). It also includes the fundamental services provided by the Campus, including links to the **CEI-MAR** Foundation itself and the **EIDEMAR** Doctoral School, both of them with their own website (see section C.5.).

CEI-MAR is also maintaining an active presence in social media for real time communication of daily information on the Campus, using a more colloquial and closer language. In this sense, a banner connected to Twitter has been connected to make the page of the partnership more dynamic so that the whole of the members of the community can upload information. At the same time, this is making the Facebook page more dynamic, in which all the marine-related news and the information on the Campus itself are published. On a document attached in **CEI-MAR** intranet, it can be checked the **CEI-MAR** web and social media statistics.



CEI-MAR disseminated the sea knowledge through exhibitions. On the left, exhibition on the garum at Baelo Claudia. On the right, opening of the "Sea Monsters" exhibition

6.- CEI·MAR audiovisuals.

The Central Coordination Office has created dissemination audiovisuals of the Campus and of specific activities: study days, conferences, interviews, promotional videos on the Campus, etc. All the audiovisuals are available on the SEA-PILLS and YOUTOUBE platforms. For two years, SEA-PILLS was the dissemination channel of the Campus of International Excellence of the Sea **CEI-MAR**. The mission of SEA-PILLS was to disseminate all of the **CEI-MAR** activities. On this channel, users could view the dissemination audiovisuals made by **CEI-MAR**, download them for off-line mode use and create a list with their favourite or videos of interest. Regarding this, a free downloadable mobile app was created. This platform is compatible with all current devices: web, tablets, iOS operating systems and Android.

After this period and, at the last stage, during which the website was fully renewed, it was decided a better way was to include this video channel directly in the access page itself and make it connected to the **CEI-MAR** channel on Youtube (<https://www.youtube.com/campusdelmar/>). On this, it can be found all the training material included in SEA-PILLS, to which the dissemination material and the whole collection of conferences of excellence delivered for all these years have been added. The development of Youtube-related tools made change our minds and favour this channel instead of the original idea, as less maintenance is needed and a major accessibility to general public is offered.





Moreover, all the photographic information on different types of events and activities are displayed on flickr, an easy access photo database (<http://bit.ly/2cKGxU6>).

7.- Proposal for the creation of a laboratory - museum of Underwater Marine Archaeology and Maritime History.

Recently, after the Ministry of Economy and Competitiveness (Mineco) granted an aid for infrastructures, there is a proposal to create a Laboratory - Museum of Underwater Marine Archaeology and Maritime History in the San Sebastian castle (Cadiz). Just opposite the **LABIMAR**, in a currently useless space, we are working with the institutions, especially the Local Council of Cadiz, in order to adequate, give content and activities to this space in relation with one of the **CEI·MAR** priority scopes of action: underwater archaeology and maritime history. This laboratory - museum, which would share the same spirit of **LABIMAR**, would complement the most scientific view of this in this space, so that the San Sebastian castle becomes a fundamental tool for **CEI·MAR** disseminating knowledge o the sea to society.

8.- Participation of CEI·MAR in the Tall Ships Race Cadiz 2016.

As the culmination of this first five years of existence, the **CEI·MAR** threw itself into the development of the Tall Ships Race Cadiz 2016. With



an array never seen before in the Campus, more than 40 activities were carried out, including workshops, exhibitions and conferences. More than 300 people including professors and researchers from the **CEI·MAR** partnership, administrative staff from the UCA and volunteering students have participated in an activity during 4 days in 5 tents settled in a 2,700 sqm space.

Out of these exhibitions, it has to be highlighted the one entitled "University of Cadiz, the university of the sea", which thanks to the **CEI·MAR**, showed an approach to the 5 pillars of excellence of the Campus of International Excellence of the Sea: knowledge of the sea, sea resources, sea management, sea cultural value and health and the sea. It was located in a 300 sqm geodesic tent with a very visual content. This tent was complemented with a conference tent, another one for workshops and exhibitions, another one with UCA's academic offer and a fifth one aimed at workshops for children's education. Moreo-



Thousands of people participated in the CEI·MAR activities during the Tall Ships Race 2016. On the left, workshop for children. On the right, exhibition "The University and the sea"



ver, the UCADIZ oceanographic vessel docked nearby the pavilion and it was visited by a great number of public (<http://bit.ly/2cHHXdS>).

During the Tall Ships Race, the programme of activities in the Pavilion of the Sea included a total of 10 workshops, 17 conferences and 9 exhibitions with a great success in terms of attendees (<http://bit.ly/2cKFslW>). The reviews in the local press were very positive and it helped to bring the CEI-MAR activities closer to the attendees, estimated in more than 1 million people. (<http://bit.ly/2cfs39g>; <http://bit.ly/2ceHa56>).



MOST SIGNIFICANT RESULTS

- ▶ Creation of the UCC+i and collaboration with CEI-MAR universities and PRIs to give support and contribute to the development and communication of activities by the CEI-MAR Campus of Excellence and its scientific dissemination activities.
- ▶ Consolidation of the UCC+i at CEI-MAR institutions.
- ▶ Creation, implementation and development of activities at the Marine Research Laboratory (LABIMAR).
- ▶ Creation, implementation and development of activities at the Marine Classroom ("Aula del Mar") in Granada.
- ▶ Restoration of the "La Esperanza" saltworks, as a space for teaching, research and dissemination activities to society.
- ▶ Creation of the OMEG as a multimedia platform on marine knowledge of the Strait of



MAJOR SETBACKS BETWEEN INITIAL OBJECTIVES AND RESULTS

For developing the "Window on the Sea" programme and due to the budgetary constraints of the CEI Programme, the Coordination Office has applied for several FECYT calls for proposals in order to carry out

Gibraltar area and abutting waters available for all users.

- ▶ Development of multiple CEI-MAR scientific dissemination activities.
- ▶ Development of CEI-MAR exhibitions.
- ▶ Development of CEI-MAR dissemination platforms and audiovisuals.
- ▶ Proposal for the creation of a laboratory - museum of Marine Archaeology and Maritime History at the San Sebastian castle.
- ▶ Participation in the Tall Ships Race Cadiz 2016.



INTERNATIONALISATION ACTIVITIES

The dissemination actions on the historical, cultural and natural values of the sea have been promoted through different formats, especially via web and social media, resulting in the internationalisation of the information and its accessibility by the whole of the interested parties. A good amount of the actions on this paragraph has been bilingual with a high participation of professors, researchers, students or volunteers from other countries, which results in a clear improvement in the internationalisation of all of these. The participation in the European Night of Researchers arises out of a European project which holds this activity in many cities of the continent (more than 250 in the edition of September 2016). Many exhibitions, both the permanent ones (LABIMAR) and temporary ones (Malaspina, Tall Ships Race Cadiz 2016) have been bilingual, as there are many foreign visitors.



many of the planned activities. Even so, thanks to **CEI-MAR** own funds, it is one of the programmes with greater development and social impact from the beginning of the Campus. The "Window on the Sea" programme has taken advantage from the implementation of the **LABIMAR** and other marine infrastructures ("Aula del Mar" in Granada, "La Esperanza" saltworks, the Strait Environmental Observatory). Moreover, a series of dissemination programmes have been successfully carried out. Given the number, quality and success of the activities, we may consider that the expectations arising out of the initial objective have been met by far.

The "Ogenus" Experience Room intended to be a virtual space for learning and advising among researchers. It has not been implemented, as virtual social media for experts came up later on, which are highly accepted among the university community (e.g. LinkedIn or ResearchGate) or databases as ORCID: these are where **CEI-MAR** and its researchers have to maintain presence. In fact, the number of **CEI-MAR** researchers, users of these media or databases has considerably increased during this period.



SECTION C.3. Improving Sports Facilities

Strategic area	Campus Transformation for Development of an Integral Social Model
Programm	Improving Sports Facilities
Objectives	<i>Objective: To promote sports activities among the CEI-MAR community as a fundamental component of inclusion, cooperation and education.</i>
Image	<p>The universities attached to CEI-MAR have bet on a strategic change in the area of Sports, as they have considered this field not only for its benefits for health and leisure but also for being an essential educational ingredient in society. For this, universities need to have quality sports facilities.</p> <p>The actions planned to develop within this Programme are:</p> <ul style="list-style-type: none"> ▶ Improving Sports Facilities Programme, especially those connected with nautical activities. ▶ Greenways on campuses.

.....

INITIAL OBJECTIVES FROM THE 2011 PROPOSAL

The original objectives were the same stated on the previous paragraph and they have remained unchanged throughout the partnership. A great job has been made in obtaining a sport infrastructure for nautical activities and marine sports.

.....

DESCRIPTION OF WORK ACCOMPLISHED

IMPROVING SPORTS FACILITIES PROGRAMME

One of the actions aimed at improving and remodelling sports facilities at the Campus of Puerto Real in Cadiz for the implementation of the Undergraduate Degree in Physical Activity and Sport Sciences, which is, to a great extent, oriented to water physical activities. The actions for improving sports facilities included:

- ▶ Upgrade and remodelling of the gymnasium and sports facilities, changing rooms and areas at the Faculty of Education Sciences.
- ▶ Adaptation of the existing swimming-pool at the Puerto Real Campus sports complex for recreational, professional and scientific diving courses.
- ▶ Arrangement of a commercial dock area of one of the premises at the Bay of Cadiz Port, so it can be used as maritime navigation and nautical sports teaching infrastructure.

Moreover, 32 sailing dinghies, 4 Topper Omega, 12 catamarans, 8 Topper Topaz and 8 Topper Vibe have been bought. Also, 27 paddle surf, 29 windsurf boards, 30 kayaks, 3 25 hp Mercury zodiacs, a closed towerline and a canoe towerline, 8 parachutes for kitesurf beginners, 18 kites, 8 kiteboards, 10 paddle surfboards, 15 surf boards and 7 sand yachts. The whole of this material is kept in local premises in the Nautical Centre Elcano and the Cortadura nautical school, both in the city of Cadiz. On the sails and boats of this material, the CEI-MAR logo has been stamped. It is foreseen to hold a nautical event with all of this material at the end of 2016.



(Nautical) sports activities.

Alongside the Andalusian coast, at the CEI-MAR universities, university nautical sports events are held. The activities organised by the UCA and the UHU are the most remarkable. The School of Marine Engineering, Navigation and Radio-electronics of the UCA programmes several regattas throughout the academic year in the waters of the Bay of Cadiz. The UHU have organised several regattas and three editions of the regatta "Alliance between UCA-UHU Universities", in which both Andalusian and international universities compete. One of the regattas was held in July 2012 in the waters of the Bay of Cadiz and the prize-giving took place at the CEI-MAR dissemination stand, organised for celebrating the Great Regatta 2012 following the acts for the 1812 Constitution Bicentennial (Link to the news 30.07.2012, <http://goo.gl/3oRFQH>). Late July 2016, CEI-MAR has participated in the organisation of the acts held at the port of Cadiz due to the Tall Ships Race (see section C.2.).

CEI-MAR promotes the "Gadinautas" association for fostering sailing in the university community (<http://www2.uca.es/asociacion/gadinautas/>). The CEI-MAR Universities display a yearly regattas calendar, which this year started with the 4th Autumn Regatta, in which more than 50 people took part. (<http://goo.gl/jHQC54>). Within the water-nautical activities, there are some training courses to highlight:

- ▶ Training day: **Surfing as a Therapeutic and Integrating Sports Model.** These sessions dealt on surf as a teaching tool for children with behavioural problems, autism and other disabilities, including a theoretical part, with three different presentations and a practical part (Link to course information: <http://goo.gl/o6cA0Z>).
- ▶ **3rd Course on Surfing and Disability.** Course for qualifying support instructors in therapeutic surfing "Solo Surf" programmes for people with autism and other disabilities. The objectives are: specific training for students

to develop good practices in educational leisure, therapeutic water activities and natural sea environment (beach) programmes, addressed to disabled people of all ages. Training, awareness, motivation and personal and professional involvement of students in the social construction process with a view to normalisation and inclusion of disabled person. (Link to course information: <http://goo.gl/QAkjP1>).

- ▶ In the field of surfing, it is worth mentioning the application within the INTERREG SUDOE 2015 call for proposals for the **SOSsurf project** (Tools for a comprehensive management of tourist activity linked with surf-related sports on the Atlantic coasts of Southern Europe). This project, pending for acceptance, has been applied for by the CEI-MAR Foundation within a consortium made up by the Insitituto de Hidraulica Ambiental de Cantabria Foundation, Surfriider Foundation Europe, University of Algarve, University of Cadiz, Andalusian Regional Government and the Terras do Infante local councils association.
- ▶ **Workshop on healthy activity and physical activity at UCA.** This initiative comprises three one-hour workshops held on the four UCA university campuses, addressed to the university community. Experts on the subject matter have informed on eating habits, i.e. what products are healthy, as well as on physical exercise as a beneficial activity for quality of life (Link to course information: <http://goo.gl/P2ETrz>).
- ▶ **Spanish University Beach Handball Championship 2014** (Links to event information: <http://goo.gl/DPOAJM>, <http://goo.gl/I0mNXw>).
- ▶ **Promotion of Sea-related Sports/Health Activities:**
 - ◇ Swimming course: activity offered at the "El Saladillo" sports complex.
 - ◇ Puerto Laja-Sanlucar de Guadiana hiking route.



The Tartessos- CEI-MAR training ship, participating in the "Alliance between universities" regatta

- ◇ Diving training course: organised by the Sports Activities Service and Science Teaching department of the UHU Faculty of Education, in collaboration with the Waterburgs PADI 5-Star Centre.
- ◇ Sailing course: organised by the UHU Sports Activities Service in collaboration with the Royal Maritime Club of Huelva.
- ◇ Canoeing course: organised by the UHU Sports Activities Service in collaboration with the Royal Maritime Club of Huelva.
- ◇ Sea baptism: organised by the UHU Sports Activities Service in collaboration with the Royal Maritime Club of Huelva.
- ◇ UHU Beach Volleyball Trophy: held at Ria de Punta Umbria beach (Link to activity: <http://goo.gl/UuxgfV>).
- ◇ Kayak route: 2 routes, through the Odiel marshlands and along the Piedras River, in collaboration with the Royal Maritime Club of Huelva (Link to activity: <http://goo.gl/u5nqsD>).
- ◇ Horse trail through Doñana: organised by the UHU Sports Activities Service, in collaboration with the Arte Andaluz Stables (Link to activity: <http://goo.gl/BCh2hA>, <http://goo.gl/X5kQ6P>).
- ◇ Fitness in water: activity carried out at the "El Saladillo" sports complex by the UHU sports service.
- ◇ Yoga day on the beach: Activity carried out at San Miguel Beach, El Rompido, by the UHU sports service (Link to activity: <http://goo.gl/dOdUMs>).
- ◇ Horse trail UHU. It is a walk on the beach and through mobile dunes and pine forests inside Doñana. The route takes approximately two hours during which one can see two Doñana's ecosystems and goes for a walk on the seashore.
- ◇ Participation in the Tall Ships Race (Cadiz 2016). This activity is explained in detail on section B.2.
- ◇ For dissemination activities of the sports offer at the partnership institutions, mobile devices apps are available in the Sports area and its offer (July 2013) (Link to news: <http://goo.gl/D3hbfW>).

GREENWAYS ON CAMPUSES

Concerning the second objective of this section, several actions have been carried out. One of these has been carried out within the Rio Tinto Greenway programme, consisting in a greenway to be implemented in the framework of the Life



Plus European project, submitted by the Local Council of La Palma, in which CEI-MAR will be involved. An interpretation centre of flour mills is foreseen. The company Atlantic Copper has ceded some plots to implement the Greenway, which means a great move forward for developing this infrastructure, <http://bit.ly/2cHKTas>.

On the other hand, another worth mentioning project is "Campus Natura". The university campus of Puerto Real, where the Andalusian Centre for Marine Studies (CASEM) is located, is the only Spanish university campus located within a protected area (Natural Park of the Bay of Cadiz). This reality led the academic authorities to consider the name of "campus natura", trying to shape a strait cohabitation between the university and the Natural Park, an especially significant cohabitation as it shelters studies such as Marine Sciences or Environmental Sciences. In fact, the proposal to obtain the "campus natura" seal, aiming at removing or

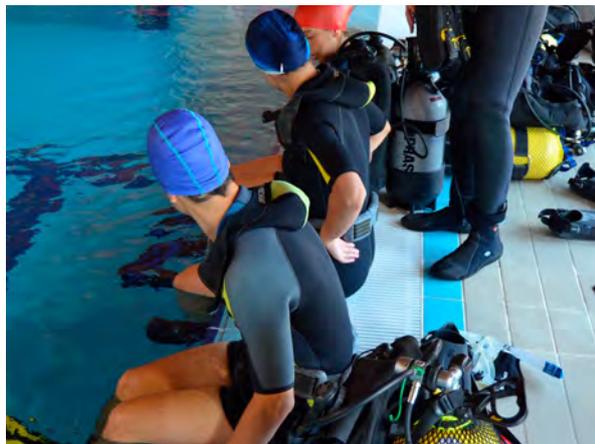
breaking physical barriers separating the natural environment from the university space, has been favourably accepted by the Andalusian Regional Government (<http://bit.ly/2cv40oV>).



ROLE OF THE PARTNERS

Within this Improving Sports Facilities Programme, CEI-MAR has promoted the acquisition of nautical material, essential for some of the qualifications offered by the CEI-MAR centres, although they can be potentially used by the partners. In this aspect, it should be highlighted the drafting of agreements for the CEI-MAR partners to use the sport facilities.

Also it has to be highlighted the organisation and implementation of some nautical activities, especially the "Alliance between Universities" regatta,



CEI-MAR specialises in teaching and disseminating water sports



led by CEI-MAR, as well as the organisation and planning of different tents in the Port of Cadiz during the Tall Ships Race, held in Cadiz in 2016, with an active participation of 7 of the CEI-MAR partners.

Concerning the training days, there have been proposals in every Andalusian province, as well as in the regions of the Algarve and North of Morocco. The activities in which major emphasis has been placed on were those related to surfing, swimming, scuba diving, canoeing, beach volleyball and beach handball.

With regards to the greenway, from the partnership, they meet the singularities of every CEI-MAR institution. The fundamental actions have been carried out in Huelva and Cadiz. The CEI-MAR Inter-Institutional Communication Committee, coordinated by the University of Malaga, has played a leading role, both in this matter and the previous ones.

MOST SIGNIFICANT RESULTS

- ▶ Improving sports facilities aimed at nautical sports at Universities of the partnership, as well as acquisition of different types of boats for practising nautical sports.
- ▶ Organisation of the "Alliance between Universities" regatta, with the participation of the "Gadinas" association.



The Tartessos- CEI-MAR training vessel participated in the Tall Ships Race 2016

- ▶ Training day: Surfing as a Therapeutic and Integrating Sports Model.
- ▶ 3rd Course on Surfing and Disability.
- ▶ Application for a project on surfing within the INTERREG call for proposals.
- ▶ Workshop on healthy activity and physical activity at UCA.
- ▶ Organisation of the Spanish University Beach Handball Championship 2014.
- ▶ Swimming, diving, sailing, canoeing, scuba diving courses, etc.
- ▶ Participation in the Tall Ships Race (Cadiz 2016).

INTERNATIONALISATION ACTIVITIES

The improvement of sports facilities represents an added value for CEI-MAR internationalisation activities as the International Summer School or the Summer Scientific Campus. The International Summer School, in particular, is an activity of a clear international dimension, with a majority of foreign students. The organisation by CEI-MAR includes, apart from the planning of specialised courses, the organisation of leisure and recreational activities, in which the nautical sports play a leading role.





MAJOR SETBACKS BETWEEN INITIAL OBJECTIVES AND RESULTS

This programme has been satisfactorily carried out as far as the acquisition and tune-up of nautical sports materials are concerned. Nautical materials have been bought and training activities in the field of the relationship between sport and sea and health have been carried out. Investments in improving facilities have been made, according to the application made in 2011.



SECTION C.4. Universal Accessibility Plan

Strategic area	Campus Transformation for Development of an Integral Social Model
Programme	Universal Accessibility Plan
Objectives	Objective: To comprehensively adapt CEI-MAR's buildings, urban arrangement, communications and services.
	The plan has mainly focused on the adaptation of some spaces to ensure the accessibility to CEI-MAR centres, as well as on some actions aiming at the inclusion of people with a disability.

INITIAL OBJECTIVES FROM THE 2011 PROPOSAL

On the **CEI-MAR REPORT 2011**, a universal accessibility plan was proposed with the aim of *comprehensively adapt CEI-MAR's buildings, urban arrangement, communications and services*. This plan was basically based on the adaptation of spaces for universal accessibility of the **CEI-MAR** centres.

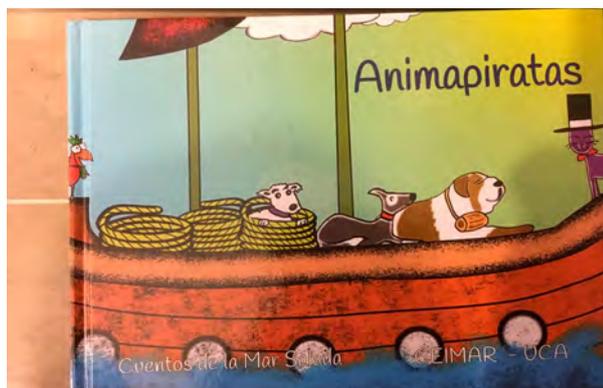
DESCRIPTION OF WORK ACCOMPLISHED

CEI-MAR received grants under strengthening calls for actions in "Rehabilitation and adaptation of university environments in the scope of Universal Accessibility and Inclusion" (text of the 2011 Call for proposals: Public-Private Collaboration Mode ONCE: <http://goo.gl/jLkzi>). These grants were given by the ONCE Foundation (Spanish Organisation for the Blind) and allowed the adaptation of university housing units for mobility and visual disabled students, in particular, the architectural adaptation of "La Caleta" student residence at the university campus of Cadiz. This adaptation consisted in removing architectural barriers of this residence, as well as the installation of a lift and Braille signage. The works

were carried out correctly, as reported by ONCE after a visit by a member of the Foundation's technical staff. "La Caleta" student residence becomes, after the adaptation, a sheltering space addressed to **CEI-MAR** students and researchers coming to stay in some of the **CEI-MAR** institutions in Cadiz.

In the Marine Classroom, a **CEI-MAR** space located in the Faculty of Sciences of the University of Granada, it was carried out an inclusive teaching activity for disabled people. The "Aula del Mar" responsible managed the activity by providing theoretical knowledge related to science and the marine environment. The theoretical part was delivered at the Marine Classroom premises, while the practical part was carried out at the local swimming-pool of Las Gabias and the Almuñecar beach.

The Marine Research Laboratory (Labimar) also boasts inclusive education in environmental education workshops addressed to children from associations for disabled such as Afamedis from Jerez. Moreover, the school workshops "The school goes to (Labi)mar" have also been carried out with students coming from inclusive classrooms of school centres of the province. The Asperger's association of Cadiz visited the Malaspina exhibition. In the water sport activities (see section C.3.), this inclusive education has been carried out through courses on surfing and disability for people with autism and other



Fairy tale published by CEI-MAR with audio-guide and subtitles for visual and hearing disabled children.

disabilities. That was an enriching experience due to the response of students participating in these activities and we intend to enhance this inclusive education area in the future.

CEI-MAR sponsored the edition and publishing of the book of sea fairy tales entitled "Los Animapiratas" ((ISBN: 978-84-608-9590-9) for visual and hearing disabled children. It is a book written by children in the 5th year of primary education with an audio-guide and subtitles. It is the first book of a 7 book collection entitled "Cuentos a manos llenas" ("Fairy tales galore").

Some of the **CEI-MAR** spaces like the Marine Research Laboratory (**LABIMAR**) in Cadiz, the Marine Classroom in Granada, the Photobiology or Primary Production laboratories in Malaga are adapted for the access of disabled people. Also, most of the Faculties and research centresn marina (**LABIMAR** e Investigaciatorias de Fortalecimiento. Otras actuaciones e Facultades e Instituciones de Investigacimngustar of **CEI-MAR** institutions comply with the regulations on universal accessibility. With regards to future works planned like the rehabilitation of the Beato Diego university residence in Cadiz or the Technology Resources Centre to be located in the "El Olivillo" building in Cadiz, we have planned the adaptation of these buildings so that they can be used by disabled people, complying with European regulations on universal accessibility.

ROLE OF THE PARTNERS

In the field of universal accessibility, some of the actions carried out have been financed by **CEI-MAR** with specific funds, obtained under strengthening calls for proposals. Some other actions have been promoted and carried out by each of the institutions making up **CEI-MAR** with the ongoing aim to facilitate universal accessibility to their premises.

MOST SIGNIFICANT RESULTS

- ▶ Adaptation of the international university residence "La Caleta" at the Campus of Cadiz for mobility and visual disabled students. This adaptation could be done thanks to strengthening grants **CEI-MAR** received and help sheltering researchers and students visiting some of the **CEI-MAR** institutions in the Cadiz area.
- ▶ Inclusion and inclusive activities for disabled people at the Marine Classroom, the **LABIMAR** and water sport activities.
- ▶ Publishing of the fairy tales book "Animapiratas", addressed to visual and hearing disabled children.
- ▶ Premises adapted to disabled people in the vast majority of buildings sheltering **CEI-MAR** activities, including faculties and research centres at the **CEI-MAR** institutions, as well as in specific **CEI-MAR** premises like the **LABIMAR**, the Marine Classroom or the Photobiology and Advanced Primary Production laboratories.
- ▶ Actions favouring universal accessibility are planned in two works under execution at the UCA (Beato Diego university residence and the "El Olivillo" Transfer Centre).



SECTION C.5. CEIMAR ICTs Programme

Strategic area	Campus Transformation for Development of an Integral Social Model
Programme	CEI-MAR ICTs Programme
Objectives	<i>To contribute to the dissemination of generated knowledge and facilitate the transfer of results by means of new technologies.</i>
	<p>A CEI-MAR multimedia platform is a crucial element for disseminating the Campus of Excellence of the Sea. For this, it is necessary to use all technological means available to increase the information among the general public, students and researchers. For this, a series of objectives were set out:</p> <ul style="list-style-type: none"> ▶ Creation of a scientific and dissemination videos channel. ▶ Creation of the web portal. ▶ Dissemination channels on social media.

INITIAL OBJECTIVES FROM THE 2011 PROPOSAL

To achieve this objective, on the first **CEI-MAR** report, a single action was proposed named as: **CEI-MAR IPTV Platform (Internet Protocol Television)**. This proposal included the implementation of an Internet television platform on the **CEI-MAR** campus, as an element for teaching and research, knowledge dissemination and international visibility. The platform aimed at making the knowledge generated by the campus available for the university community and society, through its different activities, such as the knowledge pills in audiovisual format developed by international experts (*Virtual Waves of Knowledge, which later on were named as "Seapills"*) and the rest of contents in the *"Campus of International Excellence of the Sea Digital Collection"*.

DESCRIPTION OF WORK ACCOMPLISHED

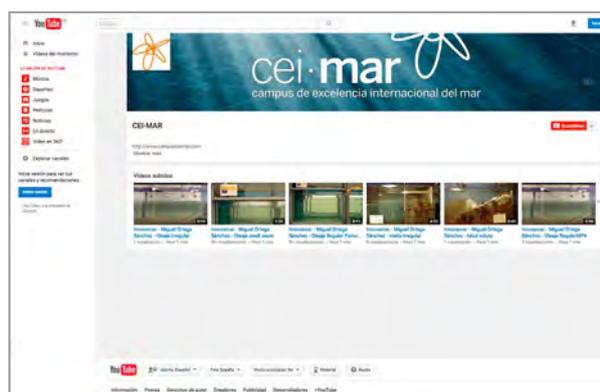
1. Creation of a scientific and dissemination videos channel

The starting point to think over an efficient dissemination of the knowledge generated by **CEI-MAR** and to help transferring results was based on the creation of the SEAPILLS platform, an app accessible from computers and mobile devices to transfer the **CEI-MAR** knowledge to society by means of concentrated audiovisual pills.

SEAPILL was a sort of television platform on the Internet, although the associated costs of a platform of the kind are high. The technology revolution overcome in the field of audiovisual resources during the last few years have led the way to an alternative, more efficient and sustainable path.

As explained on section A.3. and mentioned on C.2., changes happened in society habits concerning the access to audiovisual resources made us opt for using a universal application with a widespread access and visited by every user having access to the net: the YOUTUBE channel.

It is a decision due to the undergoing changes in society during the past years in relation with the use of the Internet. At the same time, this makes the achievement of the planned objectives feasi-



The CEI-MAR Youtube channel (right) replaced SEAPILLS for dissemination of audiovisual contents on Campus´ activities

ble in the long term. This is so because the YOUTUBE channel allows publishing the audiovisual resources hosted at no charges and it also removes all physical dependence of necessary and expensive video servers required, due to the weight of current HD quality products, which can be filmed with the simplest mobile device.

For all this, all the contents linked to that original platform were hosted in the CEI-MAR YOUTUBE channel (<https://www.youtube.com/user/campusdelmar>) together with the rest of the audiovisual material for teaching, research, dissemination and information, which different CEI-MAR partners have decided to host in this channel.

The open access to knowledge represents a social change undergone for the last years to which CEI-MAR did not help paying attention. For this, our ICT strategy to transform the Campus into a comprehensive social model has followed the path of taking advantage of the Internet by means of the *Open Courses* web (<http://cursosenabiertto.uca.es/en-abierto/>), available for the partnership since 2013 and from which one can access more than 420 videos of academic, training and dissemination interest.

2. Creation of the web portal.

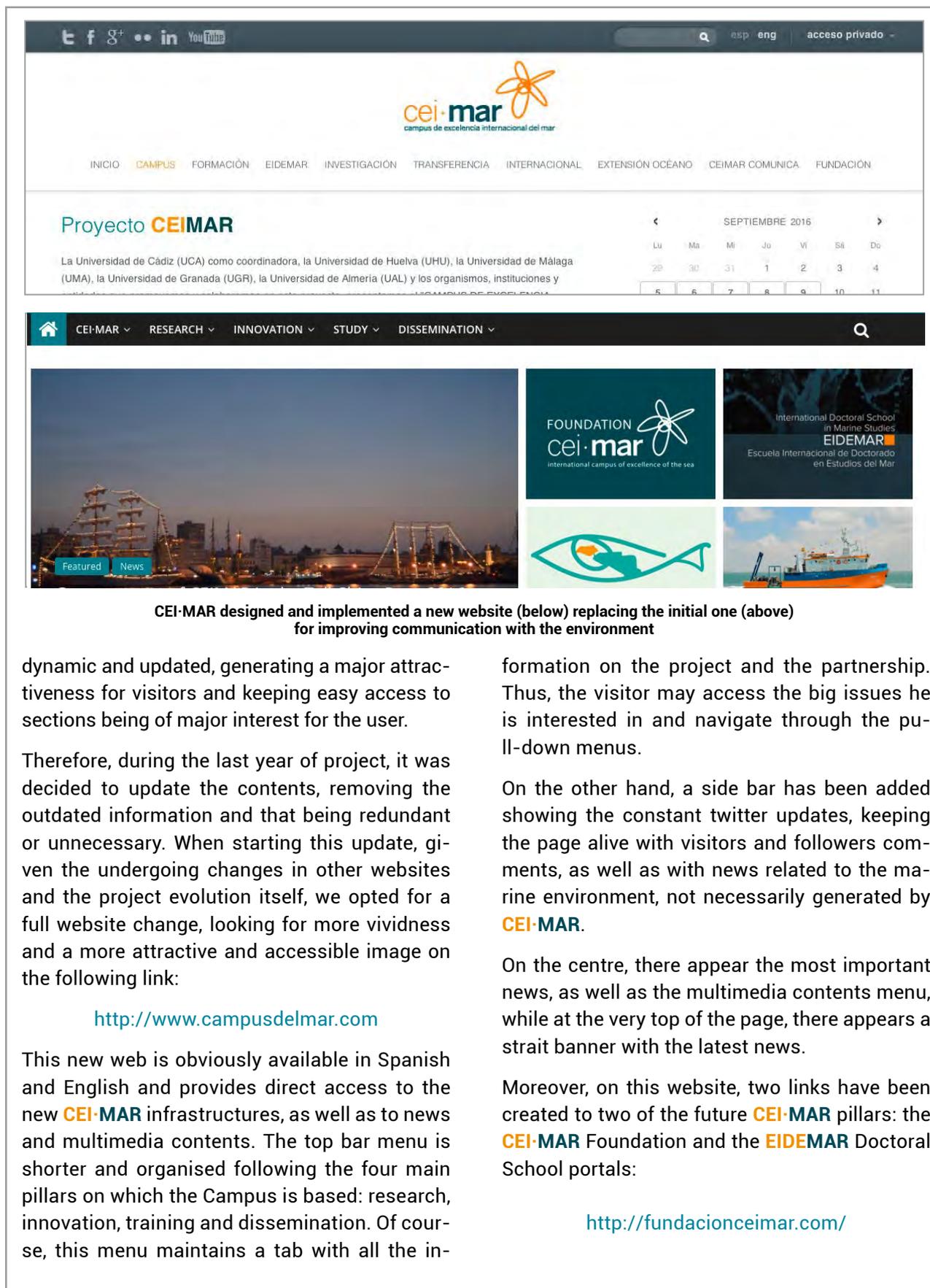
After the CEI-MAR foundation in 2011, a web portal was created to include all the objectives and the mission of the recently created Campus. On this, the user could find the original ideas of the partnership, as well as a great number of des-

criptions and interests of each of the partners. This site was increasing throughout the 5 years, as it was the link between the partnership and the academic-scientific environment and society. On this site, in addition to the original information on the Campus, happening news and changes were uploaded, especially the calls for proposals the Campus was launching, as well as its achievements. On the other hand, this was the place to announce the acts and events each partner was organising, including the agenda with all the events.

The general look of the web portal can be seen in the following picture, in which numerous tabs can be seen, most of them linked to the mission and first projects. The agenda can be seen on the right-hand side, in which highlighted events and acts were coming up in different colours. At the top, there appeared the link to the main social media created for CEI-MAR, which will be addressed on the next paragraph.

All of this made the site grow and include a great amount of information, some of which was not of great interest any more and could be considered as outdated. This made difficult the navigation and communication with people interested in the actual news, objectives and activities of the Campus.

On the other hand, throughout these years, there have been changes in website designs, with a major presence of pictures and more relation with the social media, which make portals look more



CEI-MAR designed and implemented a new website (below) replacing the initial one (above) for improving communication with the environment

dynamic and updated, generating a major attractiveness for visitors and keeping easy access to sections being of major interest for the user.

Therefore, during the last year of project, it was decided to update the contents, removing the outdated information and that being redundant or unnecessary. When starting this update, given the undergoing changes in other websites and the project evolution itself, we opted for a full website change, looking for more vividness and a more attractive and accessible image on the following link:

<http://www.campusdelmar.com>

This new web is obviously available in Spanish and English and provides direct access to the new CEI-MAR infrastructures, as well as to news and multimedia contents. The top bar menu is shorter and organised following the four main pillars on which the Campus is based: research, innovation, training and dissemination. Of course, this menu maintains a tab with all the in-

formation on the project and the partnership. Thus, the visitor may access the big issues he is interested in and navigate through the pull-down menus.

On the other hand, a side bar has been added showing the constant twitter updates, keeping the page alive with visitors and followers comments, as well as with news related to the marine environment, not necessarily generated by CEI-MAR.

On the centre, there appear the most important news, as well as the multimedia contents menu, while at the very top of the page, there appears a strait banner with the latest news.

Moreover, on this website, two links have been created to two of the future CEI-MAR pillars: the CEI-MAR Foundation and the EIDEMAR Doctoral School portals:

<http://fundacionceimar.com/>



<http://eidemar.uca.es/>

This new structure is much simpler and more accessible. The web portal is much more dynamic and updated and reflects better the actual reality of the Campus.

3. Dissemination channels on social media.

From the very beginning of CEI-MAR, it was obvious that communication with society had necessarily to be made mainly, through the social media, on which a major part of the population, mainly in the younger age group, interact with information. In this sense, the Facebook and Twitter accounts were created and linked to the available resources at the CEI-MAR partnership itself and its partners.

<http://bit.ly/2d31y8p>
<http://bit.ly/2cDJv7w>

The success achieved on these media can be seen on the annex showing the full analysis. We have approximately 2,000 followers in each media, showing the greatest impact among the Spanish public even though there is also a great number of visits from Latin America. On the other hand, it is remarkable that the main age group is around 20 years old, which is a normal data taking into account the themes of the pages focused on training, research and dissemination. These results show the usefulness of these media when disseminating information among this target public.

In addition to these pages, there are other two for CEI-MAR singular spaces, such as the LABIMAR and the "Aula del Mar":

<http://bit.ly/1PkHFZ8>
<http://bit.ly/2cclVOw> and <http://bit.ly/2d32Xw5>.

These spaces provide information on their activities and also on the news of the Campus of Excellence to the public.

These communication tools are additionally

enhanced by the channels available on social media at the Scientific Culture and Innovation Units (UCC+i). The UCC+i are entities which have thrown themselves into the CEI-MAR project and have become one of the most active players in dissemination of science and innovation, making key contributions for improving scientific training, culture and knowledge among citizens (see section C.2.).

Apart from their participation in the dissemination projects, these units help transferring dissemination by permanently updating information of interest in channels such as the Newsletter I+T (<http://bit.ly/2cilvc6>) in which both knowledge and transfer relationships between CEI-MAR and companies are disseminated.



ROLE OF THE PARTNERS

The role of the partners has been the interaction, participation and creation of resources by every partner to provide contents for different communication media implemented to deliver the CEI-MAR message to the whole of the community of the Campus of International Excellence, the academic and scientific sector and the general public: CEI-MAR YOUTUBE channel, CEI-MAR web, LABIMAR web, "Aula del Mar" web and FACEBOOK and TWITTER – related channels.

Concerning knowledge dissemination through social media, it is worth mentioning the activity carried out by the Scientific and Knowledge Culture Units at the CEI-MAR institutions.



MOST SIGNIFICANT RESULTS

The most significant result is the creation of different communication channels to deliver the CEI-MAR message (teaching, research, transfer, information, dissemination...) to the community made up by the Campus of Excellence members, the national and international academic



and scientific community and the general public, highlighting the **CEI-MAR** YOUTUBE channel among any other tool created. The website is updated at present and looks more modern and suitable for current web environments.

The ICT programme to help dissemination of the generated knowledge and its transfer to society has enabled resources for on-line training and video-conference, which have been widely used by **CEI-MAR** partners to disseminate on-line and live teaching days, regulated teaching, conferences and to help holding work meetings at regional, national and international level.

INTERNATIONALISATION ACTIVITIES

The use of the YOUTUBE platform to disseminate knowledge represents the most efficient indicator to do so beyond our frontiers, this activity being even more efficient when a great part of the contents is linked to interviews and testimonies by international scientific celebrities. The majority of the products made has been edited in English or in a bilingual format.

In the ICT programme, the integration of actions aimed at multiplying the communication media for on-line training and video-conference among **CEI-MAR** partners has helped fostering and increasing communication and holding virtual meetings with partners of the University of Algarve and Abdelmalek Essaâdi University and other national and international institutions.

MAJOR SETBACKS BETWEEN INITIAL OBJECTIVES AND RESULTS

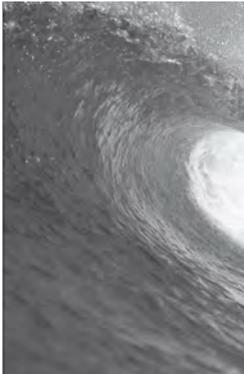
The original idea of creating a television platform on the Internet was modified and, therefore, evolved to a technology devise, which takes advantage of resources available through social media and the YOUTUBE channel. All of this has contributed to generate audiovisual information, a very popular format nowadays within the social change models. However, it is worth mentioning that the ICT programme for contributing to disseminate knowledge has counted on a key ally in actions which have been explained into detail on section A.4. On that section, they are explained the characteristics of the ICT investment aimed at the improvement of teaching and the adaptation to the EHEA. Among the projects described thereof, it is worth mentioning the effort made to fit the **CEI-MAR** space with video-conference and on-line training resources. Therefore, we have significantly moved forward in relation to the original plan on implementing a sort of television channel based on the Internet, since if this original plan is based on a one-way communication, the ICT actions that have been finally carried out in on-line teaching and video-conference, allow a two-way communication, helping the partners to interact easing the international teaching through the media and work meetings by video-conference.







SECTION C.6. CEI-MAR Sustainability Programme

Strategic area	Campus Transformation for Development of an Integral Social Model
Programme	CEI-MAR Sustainability Programme
Objectives	<i>Objective: To define viable projects that bring together economic, social and environmental aspects of CEI-MAR.</i>
	<p>To achieve this objective, on the CEI-MAR 2011 REPORT, the following actions were set out:</p> <ol style="list-style-type: none"> 1. Energy Efficiency and Sustainability Programme. 2. Waste Recycling and Reuse Programme. 3. Clean Transportation Programme. 4. Equality on Campus. 5. Volunteering and social action on Campus.

INITIAL OBJECTIVES FROM THE 2011 PROPOSAL

On the 2011 report, the initial objectives are those stated on the previous paragraph.

DESCRIPTION OF WORK ACCOMPLISHED

CEI-MAR considers sustainable development to be a hallmark of its identity. A number of actions have therefore been conceived and carried out to instil and integrate in its policy, measures to address environmental protection, equal opportunity and social responsibility. The main actions have been:

Energy Efficiency and Sustainability.

Within a Campus of Excellence with the characteristics of CEI-MAR, the need to foster research in clean and renewable energies, especially from marine origin, seems obvious, but it is also impor-

tant to be an example in assuring energy saving, as well as the reduction of environmental impact in the physical spaces of CEI-MAR.

In this sense, different initiatives have been launched encompassing the improvement of infrastructures (some of them, already explained on section B.8., especially those related to sustainable laboratories) and awareness. In this first field, it should be highlighted the energy sustainability diagnosis carried out for CEI-MAR laboratories, attached to the last editions of the calls for proposals of infrastructures by the Ministry of Economy and Competitiveness (MINECO). Also the last strengthening projects of the Andalusian Regional Government applying for implementation projects on renewable energies, as it is the case of the CASEM cultivation plant, in which they have installed solar panels to obtain energy (poner enlace a ica de mayor magnitud ubicada en un casco urbano de España (eresados, nacionales y extranjeros, acerca de estator the cover of the Faculty of Economic Sciences, in which they have installed the most important photovoltaic station located in a city centre in Spain (<http://bit.ly/2bXkBzb>).



CEI-MAR fostered the "Ecopuertos" project, a pioneering project for waste management, integrated by the Andalusian Government in its strategy on fisheries activities environmental efficiency

In the latter field, it should be underlined the organisation of conferences on energy saving and sustainable consumption, as it was the case, at different times, during the "Act Green" weeks, holding study days, workshops and exhibitions on sustainable mobility, responsible consumption, transport, health, environmental regulations, recycling, gender and environment or the "Sustainable University: Green Homes" campaign, <http://goo.gl/Ydlr8l>.

Waste Recycling and Reuse.

Like the just mentioned, this second group of activities connects with the will of a Campus of Excellence being called to the environment, in which not only research lines related to reusing resources are fostered, but also where they try to put that into practice in the Campus itself, while holding dissemination and promotion activities.

Among the most significant projects promoted by the CEI-MAR on this field, it should be highlighted the "Ecopuertos" project. It deals with the management of waste generated by the fisheries industry, the recovery of sea rubbish by trawling and also with the elaboration of by-products aimed at human consumption out of low commercial value species and the installation of hybrid electrical - gas turbine engines in the fishing boats. **Ecopuertos** is a pioneering project in Euro-

pe, conceived out of the experience acquired during the execution of the project "Motril: Fishing Eco-port. Sustainable and Supportive Littoral", in the fishing port of Motril (www.ecopuertos.es). This project has been included in the directive of Andalusian ports (<http://bit.ly/2cBYRNd>), and the Andalusian Regional Government itself has integrated this when devising the Andalusian strategy on the environmental efficiency of fisheries industry (Agreement 23 February, 2016, published on the Andalusian Official Journal (BOJA) on February 26). By the way the strategy is drafted, it is deduced the role CEI-MAR has to play as an integrating entity, with the ability of implementing this strategy in every fishing port in Andalusia during the period 2016-2020.

In the field of the **Ecopuertos** project, we are developing a strategy for the participation of CEI-MAR Universities in the Fisheries Local Action Groups (FLAGs) in order to channel part of the potential aids, which could be granted by the European Maritime and Fisheries Fund (EMFF). The role of CEI-MAR, integrating its different partners in a joint application lay bare during different meetings with CEI-MAR Universities and PRIs to submit the project and implement the next phase of activities. Meetings have taken place in Almeria, Malaga, Granada and Cadiz in which the main research groups on this topic have participated. We are also turning to other additional financing



sources by private entities. As an example, we are working on preventive actions for localisation, removal and characterisation of waste on shallow seabeds, mounts near the shore, watercourses and inlets on the Mediterranean coast. From the next school year, these actions will be complemented by the same type of actions on behalf of 17 school centres of coastal towns. These actions are co-funded by the public company Ecoembes.

In addition to the activities arising out of this project, many events have been organised at different locations of the partnership, aimed at raising awareness and the dissemination on new recycling and reuse trends. Among them, we may highlight:

- ▶ “Art and Recycling” Workshops and “Training courses” in the framework of the “RE-CAPACICLA” project, consisting in art, leisure and professional activities on recycling and reuse of waste materials (<http://goo.gl/nwvqTU>, <http://goo.gl/n7bqVg>, <http://goo.gl/gYyXNY>).
- ▶ Seabeds Clean-up (<http://goo.gl/OZAY7Y>, <http://goo.gl/ksRFD2>).
- ▶ Recycling Day at CEI·MAR (<http://goo.gl/WWZDnY>).
- ▶ Environmental awareness and participation workshops (<http://goo.gl/VXa2au>).
- ▶ Green glass <http://goo.gl/aGZ36g>
- ▶ Recycling activity at the Malagueta beach (ECOCAMPUS)

Finally, numerous coast, wetlands and even seabed clean-up working days have been carried out by different centres of the CEI·MAR partnership.

Clean transportation.

The CEI·MAR Campus of Excellence has joined the “Ecocampus” project launched by the Andalusian Regional Government. This project boasts an important aspect concerning training and creation of volunteering networks, and also plays a leading role in sustainable improvement of Campuses, by creating programmes aiming at

clean transport. In this sense, there have been different initiatives which could be gathered around three key areas, in many cases, implemented by local organisations (from local councils to ecologist organisations):

- ▶ Fostering public transport use by transport aids and increasing the frequency.
- ▶ Awareness campaigns for sharing private vehicles.
- ▶ Fostering and improving the use of bicycles.

Equality on Campus.

CEI·MAR gender equality policy complies with the one stated by the Equality Units of the associated universities promoting CEI·MAR. In particular, we stick to the gender strategy of the University of Cadiz, as the coordinating university of the partnership. This strategy is horizontal, both concerning values of Social Commitment: “creating spaces for socialisation, human values dissemination and equal opportunities guarantee, gender equality and a full inclusion of disabled people”; and concerning the objective “Developing a social model integrated in the Campus allowing the dissemination of sustainability, equality and cultural values to society”.

In every call for proposals as well as in staff hiring and appointment in the Campus, equal opportunities policies included in the gender strategy have been observed, sticking to a merit-based selection process. The outcome is a clear gender equality policy when it comes to recruitment, selection of pre and post-doctoral contracts and beneficiaries of travel allowance, etc.

Volunteering and social action on Campus.

The objective is to reach a major involvement in social action within the CEI·MAR community, fostering social commitment, professional ethics and critical spirit, social and citizen participation, volunteering and association processes. To this respect CEI·MAR has carried out many actions,



promoting different activities for students, members of the university community, social players and specialised groups of volunteers arising out the university community itself. The **CEI-MAR** Coordination Office has enhanced and strengthened those volunteering programmes more related to the marine environment, such as those developed in the framework of the "Dreamers" Grant or by the FAMAR Association.

One participating activity of a great interest is the Citizen Science project "**Sea Watchers**". It is a project led by Dr. Elisabetta Broglio from the Sea Sciences Institute (CSIC Barcelona), focused on the dissemination of knowledge on the marine environment and the collection of valuable data by an active participation of citizens. Thanks to the Aula del Mar (UGR) and the **LABIMAR** (UCA), a collaboration agreement with **CEI-MAR** is being outlined. The objective is to make **CEI-MAR** a link institution and a coordination centre of the tasks to be carried out on the Andalusian coast in the framework of the "Sea Watchers" project (<http://bit.ly/1gfck5p>).

Other volunteering and social action initiatives include:

- ▶ FAMAR-EA Environmental Volunteering. Environmental education project in collaboration with the EDEA Group from the ecology section of the UCA Biology Department, to spread awareness about the value of marine phanerogams (<http://goo.gl/0u-HFGT>, <http://goo.gl/Kva6RE>, <http://goo.gl/mcqiUG>, <http://goo.gl/vNZbXY>, <http://goo.gl/HEBD6F>, <http://goo.gl/G8qaNU>, <http://goo.gl/2DsIVD>, <http://goo.gl/yb64EF>).
- ▶ Environmental volunteering to clean the "El Duque" salt marshes. Organised by the Huelva Department of the Environment, volunteers from the Sustainability Class, the Aramba Association, the Ituci Verde Association, Scouts Huelva, Las 3 Cabras Active Tourism and the Youth House of Aracena (<http://goo.gl/LW6NrD>).
- ▶ Environmental volunteering Invaders Group 2 – *Oenothera* Odiel Marshlands Protected

Area, organised by the Sustainability Class of the UHU and SEO (<http://goo.gl/Hcn1G1>).

- ▶ Environmental volunteering to preserve Andalusia's rivers. "Andarrios" programme: Ribera de la Nicoba (<http://goo.gl/GEw10i>).
- ▶ Environmental volunteering, Wetlands Day – *Oenothera* Odiel Marshlands Protected Area, organised by the Sustainability Class of the UHU and SEO (<http://goo.gl/508aPG>).
- ▶ Environmental volunteering, banding of passerines – Odiel Marshlands Protected Area, organised by the Sustainability Class of the UHU and SEO (<http://goo.gl/477LS0>).
- ▶ Ecocampus volunteering programme "Removal of invader exotic flora", Bay of Cadiz National Park.
- ▶ Awareness activity at the La Breña and Marismas de Barbate Natural Park.
- ▶ Organisation of the Andalusian universities Volunteering Conference.
- ▶ In the framework of the Ecoportos project, they are also coordinating environmental volunteering actions with the participation of scuba divers, hikers and local schools to respectively pick up rubbish from the shallow seabeds, paths and beaches.
- ▶ Removal of the "cat nail" invader species from a Dune Park in Matalascañas. These environmental volunteering working days, organised by the Sustainability Classroom of the University of Huelva and the Spanish Ornithological Society (SEO), consisted in removing the plant known as "cat nail" (*Carpobrotus edulis*) in the Dune Park in Matalascañas. It was an activity carried out with the collaboration of Regional Department of Environment and Land Use and the Almonte Local Council.
- ▶ Banding in the Odiel Marshlands Protected Area (in collaboration with the Spanish Ornithological Society, SEO).



- ▶ Lead removal in Doñana. This activity is repeated every year as the greylag geese (*Anser anser*) winter in Doñana, feeding with the sea clubrush (*Scirpus maritimus*) rhizomes. For helping digestion, they gather at the "Cerro de los Ansares", the highest dune in Doñana, to eat sand. Some thirty years ago, they were hunted in these concentrations, leaving behind tons of lead of the cartridges, which mixed with the sand, poison the geese nowadays when ingested, jeopardising the rest of the food chain due to bioaccumulation.
- ▶ Environmental restoration of the Odiel tidal river. Activity focused on the planting of native species on the left bank of the Odiel tidal river. This activity was carried out by volunteers and assistance of the Welcome and Documentation Centre at the Port of Huelva.



ROLE OF THE PARTNERS

As stated on the previous paragraph, the activities have been promoted and financed by CEI-MAR, involving most of the partners. In the case of the Ecopuertos project, the activities have been coordinated by all partners. The CEI-MAR has promoted a participation strategy in the Fisheries Local Action Groups of every province. The CEI-MAR will intend to comprehensively implement the role of Andalusian university in these groups.

Concerning other activities related to equality and volunteering, a fluid communication has been established between the CEI-MAR Coordination Office and the different Campus offices, including the UCC+i. For internal coordination of these activities, the CEI-MAR Foundation board has played a leading role.



MOST SIGNIFICANT RESULTS

The most significant result has to do with the implementation of the Ecopuertos project, a project

containing scientific, environmental awareness, volunteering and solidarity elements. (<http://ecopuertos.es>). The Andalusian Regional Government has integrated this project in its Andalusian strategy on the environmental efficiency of fisheries industry (BOJA February 26, 2016). By the way the strategy is drafted, it is deduced the role CEI-MAR has to play as an integrating entity, with the ability of implementing this strategy in every fishing port in Andalusia during the period 2016-2020.

It is worth mentioning the Citizen Science project "Sea Watchers". It is a project focused on the dissemination of knowledge on the marine environment and the collection of valuable data by an active participation of citizens. Thanks to the Marine Classroom (Granada) and the LABIMAR (Cadiz), CEI-MAR is the link and coordinating institution of the tasks to be carried out on the Andalusian coast in the framework of this project (<http://bit.ly/1gfck5p>).

These are the most significant results in the field of volunteering and environmental awareness campaigns, workshops and participation working days:

- ▶ FAMAR volunteering for dissemination of values of seagrass meadows (<http://goo.gl/Ydlr8l>).
- ▶ Campaign "Sustainable University: Green Homes" (<http://goo.gl/Ydlr8l>).
- ▶ "Art and Recycling Workshops" and "Training courses" in the framework of the "RE-CAPACICLA" project, consisting in art, leisure and professional activities on recycling and reuse of waste materials (<http://goo.gl/nwvqTU>, <http://goo.gl/n7bqVg>, <http://goo.gl/gYyXNY>).
- ▶ Seabeds clean-up (<http://goo.gl/OZAY7Y>, <http://goo.gl/ksRFD2>).
- ▶ 5th "Act Green" Week. Lectures, workshops and exhibitions on sustainable mobility, responsible consumption, transport, health, environmental regulations, recycling, gender and environment (<http://goo.gl/Rx0P7T>).



- ▶ Recycling Day at CEI·MAR (<http://goo.gl/WWZDnY>).
- ▶ Environmental awareness and participation workshops (<http://goo.gl/VXa2au>).



INTERNATIONALISATION ACTIVITIES

The activities within the Copuertos project are carried out with Fisheries European Funds. At present, we are arranging the participation of CEI·MAR universities in the FLAG (Fisheries Local Action Groups) in order to implement a joint CEI·MAR proposal for the EMFF.

Another international activity has been the Citizen Science project "Sea Watchers", a project led by Dr. Elisabetta Broglio from the Sea Sciences Institute (CSIC Barcelona), focused on the dissemination of knowledge on the marine environment and the collection of valuable data by an active participation of citizens. The objective is to make CEI·MAR a link institution and a coordination centre of the tasks to be carried out on the Andalusian coast in the framework of the "Sea Watchers" project, through the "Aula del Mar" which will coordinate the activities on the Andalusian Mediterranean and the LABIMAR in the Andalusian Atlantic coast (<http://www.observadoresdelmar.es/>).



MAJOR SETBACKS BETWEEN INITIAL OBJECTIVES AND RESULTS

The development of this programme is unbalanced. CEI·MAR has carried out actions, covering all aspects included in the objectives, although more efforts have been made in "waste recycling and reuse" or "volunteering and social action". In other actions, such as the "energy efficiency", "clean transportation" or "Equality on Campus", some activities have been carried out. In the case of the "Equality on Campus" programme, even though we have been implementing the gender policies of the partners' institutions, we intend to create a specific CEI·MAR Equality Plan in the near future.

Table II. Main obtained results



TABLE II. Main obtained results

No.	AREA STRATEGIC	DESCRIPTION	FORMAT	ACHIEVEMENT DATE
1.	GOVERNANCE	Creation and implementation of the CEIMAR Foundation	Documents / Articles of association	12 December, 2012
2.	GOVERNANCE	Implementation of CEIMAR Inter-Institutional Committees	Face-to-face meetings and video-conferences. Meetings minutes on the Campus website	- Official creation of the inter-institutional committees in January 2014
3.	GOVERNANCE	Implementation of CEIMAR Central Office and delegations in every University.	Contracts	January 2012. Different dates in 2012 and 2013. Moving in the current central office in 2014.
4.	GOVERNANCE	Award of the CEIMAR Seal of Excellence to the National Autonomous University of Mexico	Agreement	6 November, 2015
5.	GOVERNANCE	Award of the CEIMAR Seal of Excellence to the University of Ferrara	Agreement	23 February, 2016
6.	GOVERNANCE	Creation, implementation and consolidation of the thematic Campus of Excellence network CEIMARNET	Agreement	24 January, 2012
7.	TEACHING IMPROVEMENT	Creation of the EIDEMAR International Doctoral School in Marine Studies and attachment of member institutions	Agreements	12 December, 2012 (several dates between May and December 2012)
8.	TEACHING IMPROVEMENT	Adaptation of graduate, master and doctorate degrees to the European Higher Education Area	Documents	Several dates between January 2013 and December 2014
9.	TEACHING IMPROVEMENT	Implementation of the joint inter-university master on "Oceanography" with the University of Las Palmas de Gran Canaria and the University of Vigo in the framework of CEIMARNET.	ANECA approval	October 2015
10.	TEACHING IMPROVEMENT	Approval and implementation of the Master on Nautical and Underwater Archaeology	ANECA approval	June 2016
11.	TEACHING IMPROVEMENT	Proposal, approval and development of 4 doctorate programmes linked to EIDEMAR: Marine Science and Technology; Marine Resources; Marine Management and Preservation; Marine History and Archaeology.	Programmes report.	July 2013 (degrees confirmation)
12.	TEACHING IMPROVEMENT	Implementation and carrying out of 3 editions of CEIMAR International Summer School	Face-to-face courses and audiovisual material	July 2014 and 2015 and July and September 2016



No.	AREA STRATEGIC	DESCRIPTION	FORMAT	ACHIEVEMENT DATE
13.	TEACHING IMPROVEMENT	Organisation of 30 EIDEMAR specialisation courses.	Reports of every course	July 2013 (degrees confirmation)
14.	TEACHING IMPROVEMENT	Doctors training programme with Ecuador and Colombia.	Agreements	2014.
15.	TEACHING IMPROVEMENT	Assignment the Erasmus Mundus doctorate on "Water Coastal Management" (WACOMA) to EIDEMAR	Face-to-face courses	Academic year 2013/2014
16.	TEACHING IMPROVEMENT	Double master degrees with the Saint Petersburg Hydro-meteorology University and with the University of Ferrara (new edition)	Agreements	Academic year 2012/2013
17.	TEACHING IMPROVEMENT	The CEIMAR Foundation obtained four Erasmus+ projects. (K103 and K107)	Approval (document)	2015 and 2016
18.	TEACHING IMPROVEMENT	EIDEMAR Singular Days: (1)"The Sea, an inexhaustible laboratory for doctoral formation". (2) "EIDEMAR with doctorate students from the Malaspina project". (3) EIDEMAR doctoral days.	Face-to-face days, CEIMAR website, sea-pills (Youtube channel), posters.	2 and 3 April, 2014 10 and 11 December, 2015
19.	SCIENCE AND TRANSFER IMPROVEMENT	Creation of the partnership's European Projects Office with delegation in Brussels.	Agreement with Vice-presidency of the Andalusian government. Standard functioning	2014 to 2015
20.	SCIENCE AND TRANSFER IMPROVEMENT	Integration in three public-private partnerships in Horizon 2020 and the European cluster "Vessels for the Future"	Integration agreements	2014 and 2015
21.	SCIENCE AND TRANSFER IMPROVEMENT	Set up and running of inter-disciplinary and inter-agency research and innovation groups at CEIMAR	Agreements and document of common interest. Work as R&i groups on thematic areas.	2014-2016
22.	SCIENCE AND TRANSFER IMPROVEMENT	Design of the CEIMAR catalogue of capabilities	Document and website	2014 edition, last review in February 2016
23.	SCIENCE AND TRANSFER IMPROVEMENT	Implementation of more than 400 public calls projects (63 international, 81 of the National Plan), with a steady increase during the 5 years of CEIMAR.	Administrative decisions	2012/2016
24.	SCIENCE AND TRANSFER IMPROVEMENT	Realisation of 1,502 contracts with companies	Contracts and carrying out of the corresponding projects	Throughout 2012 up to 2016
25.	SCIENCE AND TRANSFER IMPROVEMENT	Call, selection and follow-up of 23 pre-doctoral contracts, seven of those for industrial doctoral theses and 36 post-doctoral contracts financed or co-financed by CEIMAR (5 of which are exclusively financed by the Campus).	Administrative decisions	2014/2016
26.	SCIENCE AND TRANSFER IMPROVEMENT	Cooperation agreement with the Ministry of Science, Technology and Productive Innovation of Argentina in the framework of the Blue Pampa project.	Agreement	2015.



No.	AREA STRATEGIC	DESCRIPTION	FORMAT	ACHIEVEMENT DATE
27.	SCIENCE AND TRANSFER IMPROVEMENT	Fostering the creation of the Shipping Maritime Cluster and performing the R&D&i management within its board of directors	Articles of incorporation and registration of the business association	January 2015.
28.	SCIENCE AND TRANSFER IMPROVEMENT	Creation of the CEIMAR Ecosystem for Innovation	Settings among CEIMAR Foundation, Blue Economy platform and clusters.	From 2013 to 2016
29.	SCIENCE AND TRANSFER IMPROVEMENT	Creation of itinerary for fostering and supporting marine-maritime entrepreneurship and definition of entrepreneurship projects at national and at the Atlantic Arch levels in the marine-maritime field.	Programme creation and calls.	2012 to 2016
30.	SCIENCE AND TRANSFER IMPROVEMENT	Publishing 19 CEIMAR monographs	Books	Several dates 2012-2016
31.	SCIENCE AND TRANSFER IMPROVEMENT	Creation and complete implementation of the Blue Economy Platform	Technology platform	September 2013 to 2016
32.	SCIENCE AND TRANSFER IMPROVEMENT	Addition of the innovation opportunities and priorities related to the Blue Economy on the Andalusia and Algarve RIS3	Document	November 2013
33.	SCIENCE AND TRANSFER IMPROVEMENT	Organisation of 22 congresses and workshops, among which they should be highlighted the ASLO-2015 Congress in Granada, the Iberian Congress on Aquaculture in Huelva and the "Anforas" Congress in Cadiz.	Workshops and website	2012/2016
34.	SCIENCE AND TRANSFER IMPROVEMENT	Organisation and participation in 34 transfer days and workshops with companies.	Workshops and website	Several dates from 2013
35.	SCIENCE AND TRANSFER IMPROVEMENT	Integration of companies and business entities: CEPESA, Telefonica, Bank of Santander, ENDESA and the Andalusian Business Association to the CEIMAR Foundation	Approval as members.	January to June 2016
36.	SCIENCE AND TRANSFER IMPROVEMENT	Fostering companies creation, itinerary for fostering and training on entrepreneurship ATREBT CEIMAR and incorporation of 17 spin-off	Awards, agreements and documents	Several dates from 2012
37.	SCIENCE AND TRANSFER IMPROVEMENT	Launch of the UCADIZ vessel, the only oceanographic vessel based in Andalusia	Infrastructure	December 2015
38.	SCIENCE AND TRANSFER IMPROVEMENT	Creation of a network with more than 200 CEIMAR scientific infrastructures	Agreement	24 June, 2014
39.	SCIENCE AND TRANSFER IMPROVEMENT	Creation and implementation of the internal programme on business innovation and regional development projects.	Public call	2015.



No.	AREA STRATEGIC	DESCRIPTION	FORMAT	ACHIEVEMENT DATE
40.	SCIENCE AND TRANSFER IMPROVEMENT	Creation of the Business Transfer Centre (works and building project under public call)	Publishing on the Spanish and European Union Official Journals	2016.
41.	SCIENCE AND TRANSFER IMPROVEMENT	Start-up of the "Advance Manufacturing Centre" project.	Agreements in the framework of the ITI Cadiz	2015.
42.	SCIENCE AND TRANSFER IMPROVEMENT	Implementation of the Environmental Observatory of the Strait of Gibraltar (OMEG).	Web platform	May 2014
43.	SCIENCE AND TRANSFER IMPROVEMENT	Set up of a CEIMAR research institutes network	Technical reports.	Different dates in 2013 and 2016.
44.	SCIENCE AND TRANSFER IMPROVEMENT	Opening of the Primary Production Advance Laboratory and the Photobiology Laboratory at the University of Malaga.	Infrastructures	2015.
45.	SCIENCE AND TRANSFER IMPROVEMENT	Opening of the "Aula del Mar" and Aqualab in Granada	Infrastructures	2015/2016
46.	SCIENCE AND TRANSFER IMPROVEMENT	Opening of the LABIMAR and upgrades in the CASEM aquaculture plant in Cadiz.	Infrastructures	2015.
47.	SCIENCE AND TRANSFER IMPROVEMENT	Highlighting "La Esperanza" salt marshes: a natural space fitted with the necessary equipment for research in marine biology, ornithology, coastal geology, ecology and aquaculture	Infrastructures	2012/2013
48.	SCIENCE AND TRANSFER IMPROVEMENT	Implementation of the CEIMAR UAV and GPR services.	Infrastructures	December 2015
49.	SCIENCE AND TRANSFER IMPROVEMENT	Organisation of 64 CEIMAR Conferences of Excellence and 10 CEIMAR Business Conferences of Excellence	Audiovisual material	2012/2016
50.	SCIENCE AND TRANSFER IMPROVEMENT	Organisation and implementation of the 2016 Scientific Summer Camp	Agreement and different audiovisual materials	July 2016
51.	SCIENCE AND TRANSFER IMPROVEMENT	Itinerant exhibition "Malaspina expedition, a sea of data" in every CEIMAR university	Exhibition material	Several dates from October 2014
52.	CAMPUS TRANSFORMATION	Creation of the UCC+i in several institutions of the Campus	Contracts / Dissemination	Several dates from 2012
53.	CAMPUS TRANSFORMATION	Launch of employability actions (core training, counselling, job offers on web channel, etc.)	Workshops, website	2012 to 2016
54.	CAMPUS TRANSFORMATION	Organisation of two editions of the Sea Scientific Festival	Dissemination / Audiovisual material	5 and 6 June, 2015 and 20 May, 2016



No.	AREA STRATEGIC	DESCRIPTION	FORMAT	ACHIEVEMENT DATE
55.	CAMPUS TRANSFORMATION	Participation in the Tall Ships Race in the Cadiz dock.	Dissemination / Audiovisual material	28 - 31 July 2016
56.	CAMPUS TRANSFORMATION	Implementation of the "Ecopuertos" project, with an integrated participation of CEIMAR partners	Different materials / website	From 2013
57.	CAMPUS TRANSFORMATION	Implementation and support of environmental volunteering activities	Workshops/dissemination/talks/conferences	From 2012
58.	CAMPUS TRANSFORMATION	Development of many scientific dissemination actions, the most significant being the "Researchers Night" due to its simultaneous implementation in every CEIMAR city.	Workshops/dissemination/talks/conferences	From 2012
59.	CAMPUS TRANSFORMATION	Creation and maintenance of the CEIMAR website	Web platform	From 2012
60.	CAMPUS TRANSFORMATION	Creation and development of social media: CEIMAR and other singular laboratories Facebook and Twitter	Web platform	Several dates from 2012

Table III. Progress indicators





TABLE III. Progress indicators

AREA	ACTION	INDICATOR	INITIAL	FINAL	% PROGRESS
TEACHING IMPROVEMENT AND ADAPTATION TO EHEA		Undergraduate degrees	55	108	96,36
		Masters	72	126	75
		Masters with quality mention (*)	N/A	8	No initial data
		International masters	8	8	0
		Erasmus Mundus masters	7	8	14,29
		Inter-university master	20	27	35
		Internal masters	19	71	273,68
		Doctorates	25	65	160
		Doctorates with Spanish universities	1	11	1000
		Doctorates with international universities	1	10	900
		Docotorates with quality mention (**)	N/A	1	No initial data
		Joint or multiple transnational degrees	2	5	150
		Expert and continuous training courses	68	92	35,29
		Nº. of Language European Certifications courses	22	174	690,91
		Nº. of courses delivered in English (stage 1 and 2)	28	71	153,57
		Nº. of courses delivered in English (masters and doctorates)	87	113	29,88
		Nº. of masters and doctorates delivered in English	10	17	70
		Nº. of stage 1 and 2 and undergraduate students	14100	32503	130,52
		Nº. of masters students	1679	2640	57,24
		Nº. of doctorate students	443	1637	269,53
		Nº. of foreign students enrolled in master and doctorate programmes	189	477	152,38
		Nº. of students in expert courses	306	616	101,31
		Nº. of foreign students in expert courses	8	11	37,5
		Nº. of foreign professors with a minimum of a 3-month stay	N/A	11	No initial data
		Nº. of CEIMAR Doctoral Schools	0	2	100
		Nº. of degrees associated with CEIMAR Doctoral Schools	0	4	100
		Nº. of masters associated with CEIMAR Doctoral Schools	0	1	100
		Nº. of Doctorate Programmes associated with CEIMAR Doctoral Schools	0	5	100
		Nº. of specialised courses associated with CEIMAR Doctoral Schools	0	4	100
		Nº. of students enrolled in CEIMAR Doctoral Schools	0	200	100



AREA	ACTION	INDICATOR	INITIAL	FINAL	%PROGRESS	
SCIENTIFIC AND TRANSFER IMPROVEMENT	Staff	Doctors researchers	972	1040	6,99	
		Permanent doctors	543	1236	127,62	
		Pre-doctoral researchers	340	371	9,11	
		Post-doctoral researchers integrated	ND	174	100	
		Technical staff	89	176	97,75	
		Six-year terms	490	1404	186,53	
	Proyects	R&D&i public calls	nº	155	402	159,35
			€	21588565	36798105	70,45
		art. 83	nº	188	323	71,81
			€	5847317	9027334	54,38
		Nº. of 7FP projects	9	48	433,33	
	Transfer	Nº. of interntional projects	11	15	36,36	
		Technology-based companies	3	17	466,67	
		Licences	4	30	650	
		Patents	10	46	360	
		PCT extenstions	8	30	275	
		JCR	754	1060	40,58	
	Scientific production	no JCR	592	772	30,40	
		Scientific publications on indexed journals in the first quartile		885	72,85	
		Book chapter	545	360	-33,94	
		Books	115	129	12,17	
		Theses	53	217	309,43	
		Theses (European mention)	16	60	275	
Foreigners	Foreign researchers	65	67	3,08		
	Foreign pre-doctoral researchers	8	12	50		
AREA	ACTION	INDICATOR	INITIAL	FINAL	%PROGRESS	
CAMPUS TRANSFORMATION		Nº. of activities with civil society organisations	570	267 <> 947	66	
		Nº. of scientific dissemination activities	20243	336 <> 20711	2	
		Nº. of volunteering activities	205	76 <> 303	48	

Table IV. Use of resources



TABLE IV. USE OF RESOURCES

STRATEGIC AREA	ACTION	FUNDING	STAFF	RUNNING COSTS	INVESTMENT	TOTAL
Area 1: Teaching improvement and adaptation to the EHEA		401.332,78 €	0,00 €	394.536,91 €	6.795,87 €	401.332,78 €
Area 2: Science and transfer improvement	* see detailed actions on Chart IV.h.	2.687.443,02 €	1.184.659,68 €(1)	586.500,06 €	916.283,28 €	2.687.443,02 €
Area 3: Campus transformation		270.660,79 €	0,00 €	270.660,79 €	0,00 €	270.660,79 €
Area 4: Staff		1.203.528,71 €	1.203.528,71 €(2)	0,00 €	0,00 €	1.203.528,71 €
General expenses (common to all the areas)		237.034,71 €	0,00 €	237.034,71 €	0,00 €	237.034,71 €
		TOTAL	4.800.000,00 €	2.388.188,39 €	1.488.732,47 €	923.079,15 €

(1) This amount includes the pre-doctoral and post-doctoral contracts costs, the recruitment of the marine and underwater archaeology expert, grants for in-company placements and Juan de la Cierva contracts

(2) Costs of Ceimar universities dedicated staff and the Ceimar Foundation staff (Governance).



BUDGETARY DESCRIPTION

Chart IV.a. Obtained funding

Funding obtained up to 30 June, 2016 below.

Source of funding	Amount obtained (€)	Funding entity	Year of the Grant
2010 Strengthening Sub-programme	230.000	Ministry of Education, Culture and Sport	2010
2011 Strengthening Sub-programme	222.256	Ministry of Education, Culture and Sport	2011
2011 Excellence Sub-programme (second stage)	200.000	Ministry of Education, Culture and Sport	2011
Preparation of CEIMAR project	100.000	Andalusian Regional Government	2010
Implementation of CEIMAR project	4.800.000	Andalusian Regional Government	2012
Implementation of actions in the Campus of International Excellence projects (CEIMAR Foundation)	107.000	Ministry of Education, Culture and Sport	2015
Erasmus+ KA 103 Programme (CEIMAR Foundation)	111.500	Ministry of Education, Culture and Sport (SEPIE)	2015
Erasmus+ KA 107 Programme (CEIMAR Foundation)	264.145	Ministry of Education, Culture and Sport (SEPIE)	2015
Erasmus+ KA 103 Programme (CEIMAR Foundation)	117.842	Ministry of Education, Culture and Sport (SEPIE)	2016
Erasmus+ KA 107 Programme (CEIMAR Foundation)	189.170	Ministry of Education, Culture and Sport (SEPIE)	2016
TOTAL	6.234.913 €		



In the following charts the use of resources according to the different funding programmes is stated

Chart IV.b. Use of resources: 2010 Strengthening Programme

Funding areas	Programme	Funding	Implementation	Adaptation of premises	Equipment	Accessibility works	Staff	Other costs	UCA investment	TOTAL
Creation of the international and inter-university Doctorate and Postgraduate Schools	Creation of the CEIMAR International Postgraduate and Doctorate School	40.000,00	7.829,74	32.169,47						39.999,21
<p>* The justification of this aid was submitted to the Universities General Secretariat on 21/03/2013.</p> <p>Description of the action:</p> <ul style="list-style-type: none"> ▶ Implementation of the EIDEIMAR International Doctoral School (7,829.74€). These are the general costs for the implementation of EIDEMAR, including meetings costs, posters, trips to different partner universities and dissemination of EIDEMAR within the partnership. ▶ -Creation of seminar rooms for EIDEMAR (32,169.47€). Mainly for the "Marine History and Archaeology" Doctoral Programme and masters linked to Arts. Location: Faculty of Philosophy and Letters at the UCA 										
Adaptation to the European Higher Education Area.	Spaces remodelling for EHEA in Cadiz/ Services infrastructure at the University of Malaga	120.000,00		46.201,84	73.778,47					119.980,31
<p>*The justification of this aid was submitted to the Universities General Secretariat on 29/04/2013.</p> <p>Description of the action: At the UCA, two specialised classrooms for teaching and research on the cultivation of new species were built. These classrooms are linked to EIDEMAR School specialised teaching, mainly to the "Marine Resources" Doctoral Programme and the CEIMAR specialised masters. At the UMA, building and fitting of virtual teaching systems / video-conference for inter-campus activities.</p> <p>The breakdown of costs made is the following:</p> <ul style="list-style-type: none"> ▶ Adaptation of premises (46,201.84€). Building of a teaching classroom for CEIMAR at the Marine Aquaculture Plant of the Andalusian Centre for Marine Studies (CASEM) and the latter installation of an electrical panel for light control inside the teaching classroom. ▶ Equipment (73,778.47€). (a) Acquisition of the necessary equipment for the installation of a virtual teaching classroom at the University of Malaga (59,980.31€), including acquisition of video-conference licences, maintenance contract, multimedia connexion box and acquisition of the rest of video and audio equipment required for the implementation of the classroom. (b) Acquisition of different equipment for CEIMAR teaching classroom at the Marine Aquaculture Plant at the UCA (13,798.16€), including a Motican camera, water supply for sole fish trays and drainage, precision scale, electrical pumps and drainage pumps, storage units and supporting pieces, feeding timers for automatic feeders. 										
Universal Accessibility	Universal Accessibility Plan	70.000,00				70.000,00			4.978,44	74.978,44
<p>* This aid was justified on 29/03/2012.</p> <p>Description of the action: Adaptation of university housing for mobility and visual disabled students. Location: "La Caleta" students' residence, University Campus of Cadiz. This 70,000€ aid was granted by the ONCE Foundation. The University of Cadiz invested its own funds amounting 4,978.44€ in order to fulfil the total amount of the investment required reaching a total of 74,978.44€.</p> <p>The amount granted allowed to carry out some works on removing architectural barriers, and adding Braille signage in university housings located in La Palma St. at the Campus of Cadiz. The works were mainly focused on lift installation in the university building for which a series of previous actions had to be addressed (demolitions) and others afterwards (placeholder facing, decorative coatings, paintings, false ceilings works, etc.) The action ended with the setting up of the Braille signage in the spaces renewed</p>										



Chart IV.c. Use of resources: 2011 Strengthening Programme

Funding areas	Programme	Funding	Implementation	Adaptation of premises	Equipment	Accessibility works	Staff	Other cost	UCA investment	TOTAL
Internationalisation	Doctoral International School and CEIMAR international network	107.187,00	42.607,75	22.118,23	42.461,02					107.187,00

* The justification of this aid was submitted to the Universities General Secretariat on 19/03/2015.

Description of the action: Adaptation of university spaces for the EIDEMAR School: Upgrade of CEIMAR marine aquaculture classrooms and adaptation of spaces for installing the LABIMAR (San Sebastian Castle, Cadiz); Audiovisual material promoting the School.

The breakdown of costs stated on the previous chart is the following:

- ▶ Implementation of the Doctoral International School and the CEIMAR international network (42,607.75€). The EIDEMAR implementation costs consisted basically in those required for the creation of the School, such as meetings at different partner universities, EIDEMAR dissemination within and outside the partnership, necessary expenses for signing agreements within EIDEMAR, preparation of university masters, costs made within the CEIMARNET network, actions for developing the audiovisual material on the School and costs for opening days and conferences at EIDEMAR.
- ▶ Adaptation of premises (22,118.23€). These funds were invested in indoor adaptation works at the San Sebastian Castle in Cadiz for the installation of the Marine Research Laboratories (LABIMAR). The transfer of these spaces was the result of a Collaboration Agreement signed on 16 June, 2014, between the Local Council of Cadiz and the University of Cadiz. At this point, it should be mentioned that the total necessary investment attained 50,000€ and, therefore, the funds available within the 2011 Strengthening aid were not sufficient, so CEIMAR had to additionally invest 27,881.77€ coming from the funding by the Andalusian University Council (CAU) in January 2012 (Andalusian Regional Government). Nowadays, these adaptation works are in progress and the necessary credit is retained. The works have to be finished by this current year.
- ▶ Equipment (42,461.02€). This line item was dedicated to the supply and installation of different equipment for spaces and premises adaptation at the Marine Aquaculture Plant of the Andalusian Centre for Marine Studies (CASEM) for teaching, research and transfer activities linked to the research areas within the International Doctoral School in Marine Studies (EIDEMAR) at the University of Cadiz campus of Puerto Real.

Academic Excellence	Physical adaptation of teaching spaces to the EHEA. Virtual teaching classrooms.	101.736,00	41.736,00		60.000,00					101.736,00
---------------------	--	------------	-----------	--	-----------	--	--	--	--	------------

* The justification of this aid was submitted to the Universities General Secretariat on 19/03/2015.

Description of the action: Adaptation of UCA classrooms for virtual teaching / Video-conference for the inter-campus teaching. SEA-Pills platform. (In progress; up to 31 December, 2014). The costs for this action are classified as follows:

- ▶ Implementation of the physical adaptation of teaching spaces to the EHEA and virtual teaching classrooms (41,736.00€). These costs are mainly related to the website and the Sea Pills platform for on-line storage and use of teaching and virtual teaching audiovisual contents and also the audiovisual preparation and presentation and main animation costs for the Sea Pills project.
- ▶ Equipment (60,000€). This item line is intended for the supply and installation of audiovisual equipment for the physical adaptation of different rooms to the European Higher Education Area. This action is still in progress for which CEIMAR can count on a retained credit.



Chart IV.d. Use of resources: 2011 Excellence Programme

Programme	Funding	Funding	Other costs Of implementation	UCA investment	TOTAL
Aid for the 2nd Stage of the Excellence Sub-programme	200.000,00	30.926,14	170.028,83	954,97	200.954,97

Description of the action: Recruitment of a technician for Campus' information support and coordination. General tasks on coordination, drafting reports, data management, assistance to companies specialised in counselling and projects implementation and participation in calls for proposals, promotional video, posters, brochures, dissemination, events, advertising, creation of a web portal, social media, etc.



**Chart IV.e. Use of resources: KA103 Erasmus+ Programme. 2015 Call.
CEI-MAR Foundation**

ACTION	FUNDING	PROJECT DURATION	N° OF MOBILITIES
KA103 SMS 2015	83.750 €	1 JUNE 2015 - 31 MAY 2017	67

Description: KA103 Erasmus+ programme SMS, 2015 call
 Key action KA1: People's mobility for learning reasons
 KA103: Mobility among programme's countries
 Education sector: Higher education
 Action (SMS): Students' mobility for qualifications (Graduate, Master and Doctorate)

ACTION	FUNDING	PROJECT DURATION	N° OF MOBILITIES
KA103SMT 2015	15.750 €	1 JUNE 2015 - 31 MAY 2017	15

Description: KA103 Erasmus+ programme SMT, 2015 call.
 Key action KA1: People's mobility for learning reasons.
 KA103: Mobility among programme's countries
 Education sector: Higher education
 Action (SMT): Students' mobility for placements (Graduate, Master and Doctorate)

ACTION	FUNDING	PROJECT DURATION	N° OF MOBILITIES
KA103 STA 2015	7.200 €	1 JUNE 2015 - 31 MAY 2017	9

Description: KA103 Erasmus+ programme STA, 2015 call
 Key action KA1: People's mobility for learning reasons.
 KA103: Mobility among programme's countries
 Education sector: Higher education
 Action (STA): Mobility for teaching staff

ACTION	FUNDING	PROJECT DURATION	N° OF MOBILITIES
KA103 STT 2015	4.800 €	1 JUNE 2015 - 31 MAY 2017	6

Description: KA103 Erasmus+ programme STT, 2015 call
 Key action KA1: People's mobility for learning reasons.
 KA103: Mobility among programme's countries
 Education sector: Higher education
 Action (STT): Mobility of staff for training



**Chart IV.f. Use of Resources. KA 107 Erasmus+ Programme. 2015 Call.
CEI-MAR Foundation**

ACTION	FUNDING	PROJECT DURATION	Nº OF MOBILITIES
KA107 2015 ALGERIA	130.615 €	1 JUNE 2015 - 31 JULY 2017	31

Description: KA107 Erasmus+ programme, 2015 call
 Key action KA1: People's mobility for learning reasons.
 Education sector: Higher education
 Action: Students' and staff mobility among programme and associated countries (KA107)
 Annex IV. Paragraph 1.j: Neighbourhood European Instrument-South
 Country: Algeria

ACTION	FUNDING	PROJECT DURATION	Nº OF MOBILITIES
KA107 2015 MARRUECOS	133.530 €	1 JUNE 2015 - 31 JULY 2017	33

Description: KA107 Erasmus+ programme, 2015 call
 Key action KA1: People's mobility for learning reasons.
 Education sector: Higher education
 Action: Students' and staff mobility among programme and associated countries (KA107)
 Annex IV. Paragraph 1.j: Neighbourhood European Instrument - South
 Country: Morocco



**Chart IV.g. Use of Resources. KA 103 Erasmus+ Programme. 2016 Call.
CEI-MAR Foundation**

ACTION	FUNDING	PROJECT DURATION	Nº OF MOBILITIES
KA103 SMS 2016	72.742 €	1 JUNE 2016 - 31 DE MAY DE 2018	70

Description: KA103 Erasmus+ programme SMS, 2016 call
 Key action KA1: People's mobility for learning reasons
 KA103: Mobility among programme's countries
 Education sector: Higher education
 Action (SMS): Students' mobility for qualifications (Graduate, Master and Doctorate)

ACTION	FUNDING	PROJECT DURATION	Nº OF MOBILITIES
KA103 SMT 2016	31.500 €	1 JUNE 2016 - 31 DE MAY DE 2018	30

Description: KA103 Erasmus+ programme SMT, 2016 call.
 Key action KA1: People's mobility for learning reasons.
 KA103: Mobility among programme's countries
 Education sector: Higher education
 Action (SMT): Students' mobility for placements (Graduate, Master and Doctorate)

ACTION	FUNDING	PROJECT DURATION	Nº OF MOBILITIES
KA103 STA 2016	8.800 €	1 JUNE 2016 - 31 DE MAY DE 2018	11

Description: KA103 Erasmus+ programme STA, 2016 call
 Key action KA1: People's mobility for learning reasons.
 KA103: Mobility among programme's countries
 Education sector: Higher education
 Action (STA): Mobility for teaching staff

ACTION	FUNDING	PROJECT DURATION	Nº OF MOBILITIES
KA103 STT 2016	4.800 €	1 JUNE 2016 - 31 DE MAY DE 2018	6

Description: KA103 Erasmus+ programme STT, 2016 call
 Key action KA1: People's mobility for learning reasons.
 KA103: Mobility among programme's countries
 Education sector: Higher education
 Action (STT): Mobility of staff for training



**Chart IV.h. Use of Resources. KA 103 Erasmus+ Programme. 2016 Call.
CEI-MAR Foundation**

ACTION	FUNDING	PROJECT DURATION	Nº OF MOBILITIES
KA107 2016 ALGERIA	96.010	1 JUNE 2016 - 31 DE MAY DE 2018	30

Description: KA107 Erasmus+ programme, 2016 call
 Key action KA1: People's mobility for learning reasons.
 Education sector: Higher education
 Action: Students' and staff mobility among programme and associated countries (KA107)
 Annex IV. Paragraph 1.j: Neighbourhood European Instrument-South
 Country: Algeria

ACTION	FUNDING	PROJECT DURATION	Nº OF MOBILITIES
KA107 2016 MARRUECOS	93.160	1 JUNE 2016 - 31 DE MAY DE 2018	30

Description: KA107 Erasmus+ programme, 2016 call
 Key action KA1: People's mobility for learning reasons.
 Education sector: Higher education
 Action: Students' and staff mobility among programme and associated countries (KA107)
 Annex IV. Paragraph 1.j: Neighbourhood European Instrument - South
 Country: Morocco



Use of resources: 2011-2016 Coordination (up to 30 June)
Internal CEIMAR funds (Aid from the Andalusian Regional Government).

They are included estimated costs, already engaged and pending of execution.

STRATEGIC AREA	DETAILS OF THE ACTIONS	TOTAL
TEACHING IMPROVEMENT AND ADAPTATION TO THE EHEA	EIDEMAR - Opening Session dissemination, social representation and miscellaneous costs	€63,236.09
	International Summer School (ISS)	€46,225.34
	EIDEMAR Courses. EIDEMAR Doctoral Programmes.	€58,214.09
	Masters aids	€7,106.50
	Equipment for teaching improvement (Cadiz)	€6,795.87
	Costs linked to the 2010 Strengthening aids (repayments)	€4,356.88
	Sponsorship of seasonal courses	€17,332.05
	Advance course on coastal aquifer and desalination plants	€2,083.35
	9th International Colloquia of the Centre for Phoenician and Punic Studies	€2,863.40
	TNC Coastal aquifers and marine intrusion	€3,149.13
	Masters aids (Almeria)	€1,694.05
	International cooperation of postgraduate teaching: CEIMAR dissemination in Brazilian and Colombian universities	€1,392.15
	EIDEMAR doctoral programmes and masters.	€1,892.80
	Sponsorship of CEIMAR Seminars of Excellence	€8,000.00
	Aid for the Mediterranean Researchers Mobility Programme 2013/14	€9,300.00
	CEIMAR dissemination in international congresses, workshops and researchers' meetings: Latin American Congress on Sea Sciences (COLACMAR)	€9,521.79
	Underwater Archaeology course (Melilla)	€7,000.00
	Course on Coastal Heritage of Huelva	€4,719.75
	Aquaculture courses (Huelva)	€2,155.00
	Training-dissemination courses	€811.44
	American Days: "Canada and Beyond"	€5,033.76
	Maritime Law Day	€672.62
	1st Odiel Marshlands International Days	€1,796.56
Other conferences/ series of conferences/ congresses (University of Huelva)	€5,116.67	



Hydraulic Fracturing Day	€1,433.63
Atlantic Ports - Trajano Day	€585.88
History of the Cinema Sessions "History of the Sea"	€1,532.02
2nd Forum on current issues by the Migrations Research Centre (CIM)	€2,213.55
Specialisation course on: "The benthonic bio-diversity in the Mediterranean Sea": macro-fauna	€8,521.34
1st University Expert Course on Sun, Sea and Health	€5,279.84
Specialisation course on Dermatological Thalassotherapy	€26,487.30
Course on Higher Training of Supervisors	€2,070.01
University Extension Course on Analytical Techniques for Isotopes Measuring in the Marine Environment	€8,632.51
Workshop on Algae, University of Malaga	€1,065.57
Sponsorship of other training actions (courses, days, symposia, seminars, etc.)	€53,918.23
Course on Environment and Global Change Federal University of Siberia	€2,276.82
Courses "Connecting with vocational training"	€2,999.00
Funds pending for allocation in Teaching Improvement and Adaptation to the EHEA	€13,847.79

Subtotal €401,332.78

**SCIENCE AND
TRANSFER
IMPROVEMENT**

Conferences of Excellence	€6,004.82
Business innovation conferences	€490.06
Marine Aquaculture Plant (Cadiz)	€1,950.00
CEIMAR scientific infrastructures and equipment (Cadiz)	€21,731.80
Organisation and participation in scientific congresses, projects and meetings	€29,285.16
Networks: Environmental Observatory of the Strait of Gibraltar (OMEG). EUROMARINE. CEIMARNET	€54,107.44
Aquaculture Transfer Days	€5,174.54
"Transfiere" Forum (several editions in Malaga)	€19,691.70
AtrÉBT awards	€35,585.66
The Blue Economy: thoughts on the technical document. Posters. Costs related to the Blue Economy	€11,767.49
Organisation of the CEIMAR R+D+i Seminar in Antequera (Malaga)	€10,458.00
UCADIZ vessel	€313,793.34
Marine Research Laboratory LABIMAR (Cadiz)	€56,186.92
Pre-doctoral contracts. Universities of Cadiz, Granada, Huelva and Malaga.	€635,084.50
Mobility (grants, EIDEMAR aids, doctorate fees, etc.)	€119,333.38
Post-doctoral contracts of doctors' reintegration in the CEIMAR partnership	€285,367.28
Pre-doctoral contracts in companies (4 contracts co-financed by the partnership). CEPESA and ABENGOA	€126,165.00
Expert in underwater archaeology	€112,402.04



Scientific equipment (Almeria)	€75,578.28
Scientific Seminar on Global Change in the Alboran Sea	€2,988.07
2nd Symposium on Administrative Law: Coastal planning and protection	€3,231.36
In-company placements grant	€2,344.86
European projects. Drafting proposals and related actions	€1,687.56
CEIMAR co-financed ERDF projects (2013 call for proposals)	€99,458.58
Delivering a series of conferences (Granada)	€9,930.39
ASLO Congress (Granada)	€13,837.20
Equipment of laboratories/ research institutes at the University of Granada	€25,997.53
Equipment and refurbishing of the Marine Classroom laboratory (Granada)	€110,433.52
Congress on the discovery of America	€2,789.17
Calls for aids to the University of Huelva research groups	€18,147.18
Dermatological Strengthening Laboratory (Malaga)	€3,810.29
Primary Production Laboratory (Malaga)	€175,492.63
Scientific congresses travel expenses aids	€15,267.36
Development of research projects on emerging areas	€46,760.00
Tsumanos Congress (Malaga)	€1,500.00
Seal of Excellence	€1,222.10
Business innovation projects	€114,485.90
Juan de la Cierva contracts	€23,296.00
Innovation cluster	€77.00
"Somos Atlanticos" workshop	€1,800.00
Funds pending for allocation in expenses on Scientific and Transfer Improvement	€31,850.39
Funds pending for allocation in other expenses on Scientific and Transfer Improvement	€60,878.51
	Subtotal
	€2,687,443.02
CEIMAR sponsorship for holding the TedxCadizUniversity event	€2,000.00
CEIMAR promotion and dissemination material (posters, merchandising, etc.)	€54,834.65
Monographs of Excellence / Publications	€72,697.62
Anniversaries celebration (IEO, Bahia de Cadiz Natural Park declaration, Sea Sciences Faculty at the UCA)	€2,743.98
Sea Pills: Platform / Audiovisual materials	€1,033.76
Sponsorship of the 2013 Great Regatta: CEIMAR dissemination	€15,575.07
Awards related to contests held in Cadiz and Huelva for CEIMAR dissemination	€2,552.08
CEIMAR research international dissemination	€3,049.07

**CAMPUS
TRANSFORMATION**



	CEIMAR exhibition at Casa Lazaga (San Fernando, Cadiz)	€2,395.34
	Sea Fair	€2,908.18
	Malaspina itinerant exhibition	€12,487.63
	Collaboration with "El Arbol de las piruletas" NGO	€800.00
	Days on Coastal Aquifers and Desalination Plants (Almeria)	€2,747.14
	Volunteering days on marine phanerogams (FAMAR) and "La Esperanza" saltworks (CONSAL)	€8,119.54
	Marine Resources round table "We move" (Huelva)	€1,039.24
	Exhibition "The Salt Marshes: A threatened amphibious ecosystem"	€2,420.41
	Celebration of the Sea international day	€599.41
	"Spanish Vessels" exhibition	€1,505.00
	Workshop on environmental education at the Espigon beach (Huelva)	€330.00
	European Researchers Night	€1,086.56
	Aids for publications, posters (University of Huelva)	€16,077.05
	Scientific dissemination events held at the Marine Research Laboratory (LABIMAR)	€14,044.36
	Expenses for the organisation of other scientific dissemination activities CEIMAR- Society	€40,275.69
	Funds pending for allocation in Campus Transformation	€9,339.02
	Subtotal	€270,660.79
STAFF	Staff from the CEIMAR partnership universities (management, internationalisation, dissemination, documentation) and the CEIMAR Foundation (manager and technical staff)	€1,162,001.54
	Funds pending for allocation in Staff	€41,527.17
		€1,203,528.71
GENERAL EXPENSES (COMMON TO ALL THE AREAS)	General expenses (coordination, office, etc.)	€83,591.09
	Expenses for web domains / computing equipment maintenance	€11,395.21
	Trips / Accommodation for several actions	€18,384.08
	Refurbishment of the CEIMAR Coordination Office equipment and materials	€22,933.69
	Attendance to CEIMAR days / Inter-institutional committees	€2,391.93
	CEIMAR international promotion. Expenses for the signature of different agreements.	€10,538.14
	Payment of complements to CEIMAR coordinators at partner universities	€29,724.33
	Taxes	€17,900.97
	Audit	€1,996.50
	CEIMAR Foundation founding capital	€30,000.00
	Funds pending for allocation in General Expenses (common expenses for all the areas)	€8,178.77
	Subtotal	€237,034.71
	Total	€4,800,000.00
	Budget	€4,800,000.00



Global execution by item line
Aggregate data: execution + future engaged expenses forecast

ITEM LINE	TOTAL	RATIO
TEACHING ACTIVITIES	394.294,04 €	8,21%
TALENT ATTRACTION	1.217.492,17 €	25,36%
R+D+TRANSFER	553.910,43 €	11,54%
EQUIPMENT AND INFRASTRUCTURES	923.079,15 €	19,23%
EVENTS AND DISSEMINATION	270.660,79 €	5,64%
STAFF	1.203.528,71 €	25,07%
GENERAL EXPENSES	237.034,71 €	4,94%
TOTAL	4.800.000,00 €	100,00%

