

ANNUAL REPORT 2015

PLATAFORMA OCEÁNICA DE CANARIAS

1. INTRODUCTION	3
2. PLOCAN.....	4
a. THE MISSION	4
b. VISIÓN	5
c. OBJETIVES.....	5
3. INFRASTRUCTURES AND FACILITIES	5
a. OCEANIC PLATFORM.....	6
b. ON-SHORE OFFICES.....	11
c. BERTH AND WAREHOUSES	16
d. TEST BED	17
e. OCEANIC OBSERVATORY	20
f. SUBMARINE INSTRUMENT AND VEHICLE BASE (VIMAS)	24
4. ORGANISATIONAL ESTRUCTURE (GOVERNING BODIES AND COMMITTEES)	27
5. PEOPLE IN PLOCAN	31
6. PROJECTS IMPLEMENTED	34
7. CO-OPERATION AGREEMENTS.....	71
8. TRAINING, FOSTERING SCIENTIFIC VOCATIONS AND DISSEMINATION.....	74
9. VISITS TO THE PLOCAN FACILITIES.....	85
10. ASSOCIATION AND CORPORATE ACTIVITIES	89
11. PUBLICATIONS, COMMUNICATIONS TO CONFERENCES AND OTHER DISSEMINATION ACTIVITIES	91
12. CORPORATE SOCIAL RESPONSIBILITY.....	93
13. MANAGEMENT SYSTEM	96
10. PLOCAN IN NUMBERS	97

1. INTRODUCTION

The administrative procedures and arrangements that had been hindering the start of work on the oceanic platform were resolved in 2015, allowing the certification verifying readiness to start to be signed. Work actually started on the 6th of March. The aptitude of the initial concrete structure (caisson) offered by the consortium that won the tender was then verified and then transported to a provisional location on the Nelson Mandela Dock in Puerto de La Luz in Las Palmas de Gran Canaria, where the building process continues. The building process will be completed with the transfer and installation of the platform in its final position in the area reserved for the Consortium's activities.

The organisation has continued its general business in 2015, promoting PLOCAN internationally in scientific and technological forums, applying for and managing projects, especially European projects, and developing the organisation as described in this report. The completion of the TROPOS project, led by PLOCAN, was one of the highpoints. All the technical and management objectives set were successfully met, in spite of the size and complexity of the project. All of this enables the Consortium to position itself as one of the European benchmarks in this field.

Major progress has also been made along the lines of management excellence, culminating in April with the award, after a roll-out period, of the first UNE-ISO 9001 quality management certificate that continues to gradually spread to the general activity of the Consortium, with a view to obtaining ISO 14001:2004 and OHSAS 18001:2007 standards.

The process of generally fitting out has also continued this year, and will be completed in 2016, at the same time as the test bed area and construction of the Platform, enabling ICTS to start its general operations.

Another highpoint of the year was the completion of the building and installation works on the public demonstration centre for innovation in information technologies and maritime communications (CDTICMar, as it is known in Spanish). This centre is located in PLOCAN's on-shore offices to promote access to technologies, opportunities and markets stemming from applying IT in the marine-maritime environment among IT-based SMEs, offering them a chance of general growth.

The amendment to the Consortium constitution agreement of the 10th of December 2007 (and its amendment of 28th December 2012) was signed on the 29th of December to comply with the Legal Regime of the Public Administrations and Common Administrative Procedures Act, Law 30/1992, of 26th November, and the Public Sector Rationalisation Act, Law 15/2014, of 16th September to bring the Consortium under the auspices of one of the administrations involved, in this case the State Administration.

There have been a large number of important international visits to the PLOCAN offices during the year, including the ambassadors of Norway, the United States and South Africa, and delegations from the prefecture of Iwate (Japan) and South Korea.

In the area of the social recognition and impact of the ICTS, we would draw your attention to the fact that the Cabildo (Island Government) of Gran Canaria awarded its top distinction, the "Can de Plata" or "Silver Dog" for science, to PLOCAN this year. The diploma and a representative figure were presented by the President of the Cabildo at a public prize-giving event held on the 27th of March 2015 in the Gran Canaria

Arena. This recognition was awarded for making Gran Canaria an international benchmark in scientific research and technological development in the marine and maritime sector.

This report reviews the most important activities of the Consortium during 2015

2. PLOCAN



Illustration 1. ICTS map

PLOCAN is an Outstanding Scientific-Technical Infrastructure (ICTS, as it is known in Spanish) belonging to the Ministry of Economy and Competitiveness ICTS Map. The Map fosters operational and strategic co-ordination of its infrastructures belonging to a same thematic area and to the internationalisation of the ICTSs, by opening them up to the international scientific and technological community in the form of actively joining the different infrastructures that belong to the ESFRI Roadmap and other Pan-European initiatives.

The first steps were taken in 2015 to create the Marine Infrastructure Network (RIM, in Spanish). The main objective of the RIM, comprised of PLOCAN and the Balearic Isles Coastal Observation System (SOCIB in Spanish) as infrastructures aimed at marine research and technological development, is to drive the exchange and development of methodologies and tools in the field of knowledge shared by the different marine infrastructures and other R+D+I stakeholders

a. THE MISSION

PLOCAN's mission is to propitiate excellence in scientific, technological and innovative development in the marine-maritime environment, accelerating the time to market of its results and products, hence

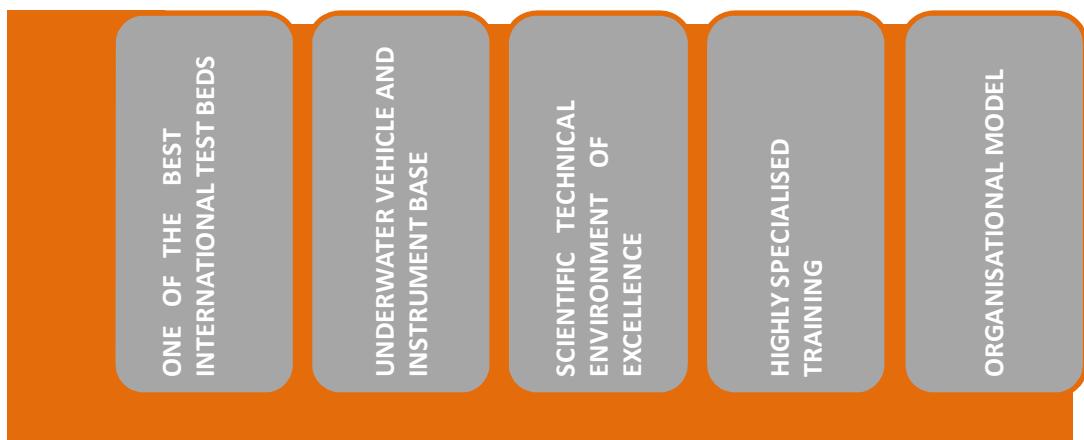
promoting economic growth and employment with efficient, environmentally sustainable access to the ocean at increasing depths.

b. VISIÓN

The vision is to be one of the most efficient scientific and technological infrastructures in the international context accelerating marine/maritime R+D+i, a benchmark for galvanising and bringing together public and private R+D+i.

c. OBJECTIVES

PLOCAN's general objective is to provide the scientific-technological community with the most effective conditions and means in the international context to carry out observations, experiences and trials at increasing depths on the off-shore platform and its surrounding environment. The specific components for the purpose are:



The consortium's activity in 2015 has focused mainly on building the platform in the sea and on establishing the necessary bases so that the aforementioned objectives can be attained more effectively. All of this falls within the general objective of driving marine-maritime R+D+i of excellence and a public-private convergence as the foundation for economic growth and sustainable employment.

3. INFRASTRUCTURES AND FACILITIES

Once the platform and the test bed are fully operational, the Consortium will have the following marine-maritime and land-based facilities and infrastructures to achieve its goals:

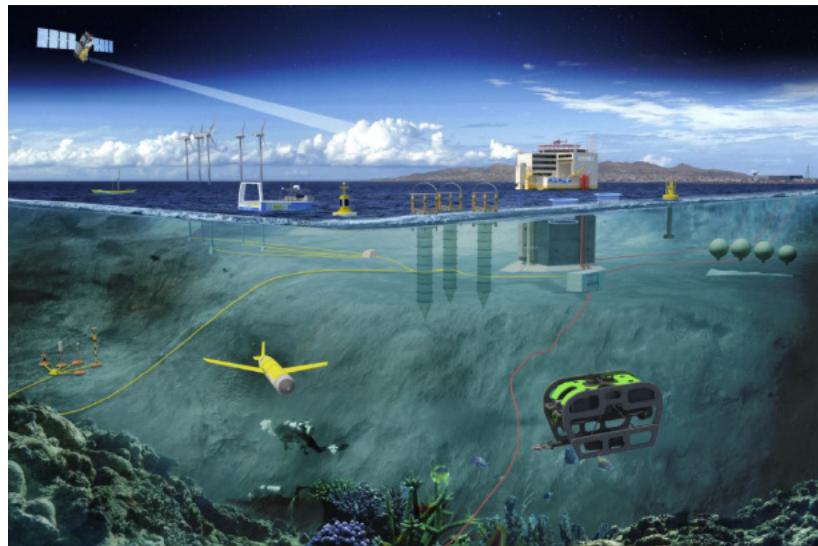


Illustration 2. Infographic of the platform and its surroundings

a. OCEANIC PLATFORM

The Oceanic Platform is in the construction phase. It will be located in the sea 1.5km off the north-east coast of Gran Canaria at a depth of about 30m. It is an amazing structure, not just because of its nature, but also because of the way it is built. It is being built in Puerto de Las Palmas, from where it will be transferred to its final location in the test-bed area when it is practically complete. The construction process is divided into 10 stages. The first stages have been partially completed in 2015 (described below in this section). These are: the construction of the caisson in a floating dock, its launch and transport to the mooring zone in the harbour, mooring in order to continue the construction process, filling the caisson with granular material and the construction of the superstructure and building. It will then be re-floated and transported to its final location, where the final foundations will have been built to support the caisson. Once it arrives at its final location, the whole platform will be moored, a protective berm will be built at the foot of the caisson and all the rest of the buildings and fittings will be completed.

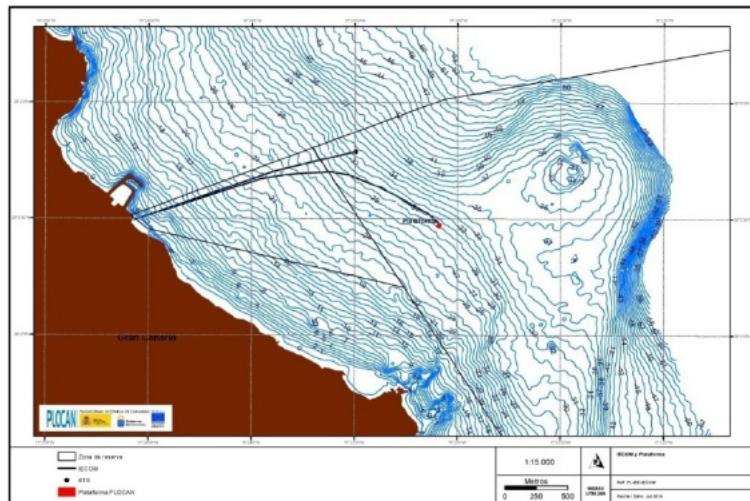


Illustration 3. Final location of the platform at sea

The building is comprised of the following floors, each with a different use:

HELIPORT	Situated over the bridge, capable of housing helicopters up to a maximum length of 15,7 m.
COMMAND CENTRE	Raise above the deck, with 360° vision. All control and operational activities of the platform and its surroundings are run from here.
BUILDING	Divided into two floors housing laboratories, classrooms, kitchen, dining room, lounge, etc. All rooms will have natural light and ventilation.
PLATAFORM LEVEL	This is an open working area where there is a test tank and a hangar. It will have a hoist with a
BASEMENT LEVEL	Houses the installations rooms (store rooms, waste treatment, general circuit breakers, tanks, waste waters, etc.).

Illustration 4. Floors of the platform

The process of obtaining the administrative authorisations for the Canary Island Oceanic Platform were completed in the first quarter of the year, concluding all the arrangements and requirements necessary in line with the applicable legislation. This made it possible to sign the verification of readiness for construction on 6th March, marking the start of the building works. In that same month, work started on preparing the aggregate for building the footing that would act as the foundation for the structure at its temporary mooring site. This provisional footing has the same composition as the foundation footing to be constructed in 2016 at the final mooring point; in other words: a rock-fill core of between 50 and 100kg, crowned by a 40cm layer of crushed screed gravel, laid using terrestrial resources for extraction, transport and loading the material and marine resources for tipping and laying the screed (hopper dredger).

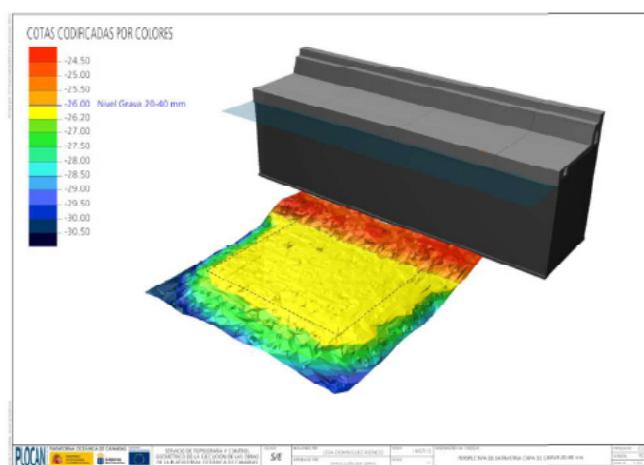


Illustration 5. Final state of the provisional footing foundation next to the Nelson Mandela dock



Illustration 6. Hopper dredger in tipping position during work on the provisional foundation bed

The work was carried out at the Nelson Mandela dock as planned, where the reinforced concrete caisson was taken and moored to act as the base of the building, once the provisional foundation had been finished and approved. The crown of the footing lies at a depth of 26m. The caisson was built on a floating dock. It is 31.50m deep, 37.95m long and 32.03m wide, with an interior mesh of 8x7 cells and a 39.95m x 32.63m footing.

With the caisson anchored and the ballast work done to keep it stable, work started on the building itself. The first step in this process was a concrete slab made of prefabricated slabs of reinforced concrete of 0.1m were laid, with a 0.20m slab on top, bringing the structure up to 2.8m above sea level to act as the basement of the facilities floor. Over the rest of the year, most of the reinforced structure was built, as the facilities floor, along with the main deck, or hangar, and most of the contention walls and buttresses. By the end of the year building had reached a height of 10.9m above sea-level.

The photos below show the different stages of construction completed to date:







Illustration 7. State of building works at the end of 2015

The part of the building that was constructed in 2015 will be used to house the following areas:

Basement deck

This deck houses the main installations and the beginning of the connection core that runs vertically through the whole structure. The layout of the rooms is influenced by the size of the cells of the caisson, so the pillars that support the upper enclosure of the basement (the floor of the main platform) coincide with the intersections of these cells. The following areas will be located on this floor, around the central distributor:

- Waste storage and treatment, with a fire lobby
- Water
- Compressed air
- Fire-protection
- General Low Voltage Switchboards
- Available as a future Transformation Centre
- Diesel fuel tanks for generators with fire lobby
- Miscellaneous installations
- Treatment: grey waters and filtration plant
- Two small areas available where the utility ducts start
- Connection core, comprised of a stair case and the lift shaft

Main platform

The main platform is 7m above sea-level, with the building over the northern half and the hangar in the middle of this. The rest is free to use as a deck. It is sheltered on the west and northern sides by the contention walls, and partially protected on the west-side too. This is an open work space measuring about 546 m².

- On the south-facing side, the least affected by wave action, is where the **trial tank** is set, measuring 6x7.78 m. and a variable depth of up to 10 m. The trial tank makes sea trials much easier

as it is much easier this way to launch specific equipment and submarine vehicles into the sea and provides direct access to the platform. It is located such that it is within reach of the telescopic arm and the gantry crane, which is especially useful for VIMAS-related operations.

- The **platform** has enough room for the gantry crane, the telescopic arm, the hoist and for stacking two containers (which will be installed in 2016). There is a large trap set in the middle of the platform, at a tangent to the building, giving access to the basement deck for equipment.
- The **hangar** is set in the northwest corner of the platform, surrounded by the contention wall, covering an area of about 354.58 m². This area has a roof, but no columns, with 8m of vertical clearance. Its location in the shelter of the contention wall allows it to act as an extension of the platform as the south-facing side, 11.75m long, is completely open, although this can be closed with a door of the same dimensions. This area also houses the following elements: connection core, changing rooms, storehouse, ventilated lobby, generators and utility ducts, fire lobby.

Wall

This closes three sides of the caisson and determines the dimensions of the hangar and the platform, while protecting them at the same time. The contention wall is 16.05 m high, matching the minimum headroom of the hangar (which has a clearance of 8m) and acts as a support for the upper floors that will be built in 2016 with a framework of metal girders.



b. ON-SHORE OFFICES

The on-shore offices, ceded by the Canary Island Autonomous Region, are located in Taliarte (Telde, Gran Canaria) in the former facilities of the Canary Island Institute of Marine Sciences, next to the Port of Taliarte, about 8km from Gran Canaria Airport and some 20km from the city of Las Palmas de Gran Canaria and the Ports of La Luz and Las Palmas.

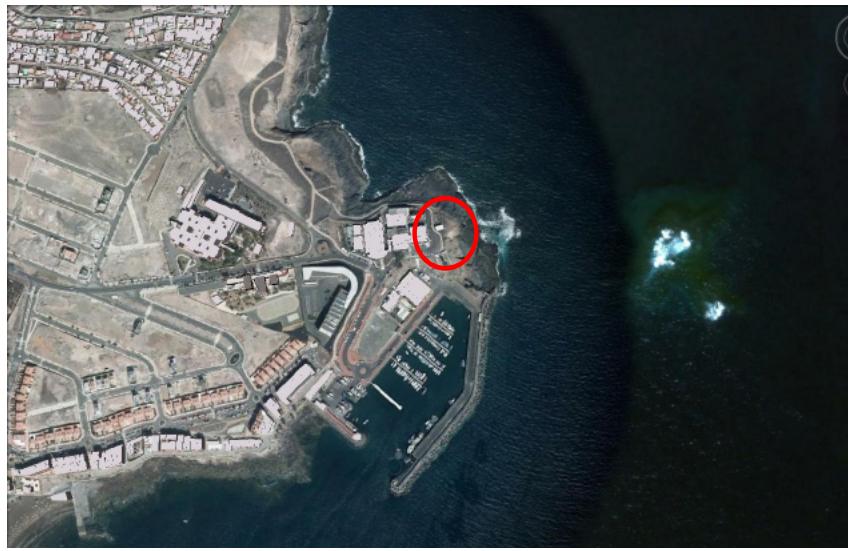


Illustration 8. Google Earth image of the location of the on-shore offices

The area has meeting rooms, assembly rooms, workshops, operation control rooms, submarine vehicle workshops (LT1), and calibration tank for submarine vehicles, laboratories (wet and dry), classrooms, offices and multi-purpose rooms.



Illustration 9. On-shore offices and Taliarte dock

2015 saw the start of a series of alterations to correct some deficiencies to the building and to adapt it to its new use. The work was funded by the Canary Island Research, Innovation and Information Society Agency and has been done to adapt the existing buildings to the new functions they are going to serve as an outstanding scientific space where the Consortium can play its role of galvanising the sectors involved in developing projects in the marine-maritime field.

The **glider laboratory** covers an area of 120 m², with space to house between eight and ten units at any one time. It is used for maintenance, accommodation and training activities. The wet lab is located next to it, with a salt-water tank, where gliders are calibrated and there is a hoist for handling them.



Illustration 10. Glider workshop

The **operation control room** measures 80 m² housing up to forty people, ten at computer work stations. It is fitted with hardware tools and software for controlling, supervising, managing and viewing the information provided by the different observation platforms in real time.



Illustration 11. Operations control room

The centre has an **oceanographic instrument workshop** and an **electronics workshop**. These two workshops are located in the same grounds, covering an area of approximately 200 m² between the two. The instrument workshop is for activities concerning oceanographic buoys (assembly and installation of meteorological and oceanographic sensors, installation of electronic control systems, etc.) that require a large working area because of their size.



Illustration 12. Instrument workshop

PLOCAN's on-shore offices house the **Gran Canaria Marine Maritime ICT Demonstration Centre (CDTICMar)**, as it is known in Spanish). This is an innovative project that provides the marine-maritime sector with technological solutions, belonging to the national network of ICT Demonstration Centres, promoted by the Ministry of Industry, Energy and tourism (MINETUR, in Spanish) through a public sector entity known as Red.es, managed by PLOCAN.

This project is possible thanks to co-funding from the European Union, through the European Regional Development Fund (ERDF) with the objective of promoting technological development and investment in R+D+I among Spanish companies and it is implemented as part of the R+D+i operating programme for the benefit of business, Technological Fund.

PLOCAN's intention is to consolidate the CDTICMar as a benchmark and meeting place, both nationally and internationally, for land-sea communication technological solutions. Two awareness-raising conferences were held in 2015, as well as developing a galvanisation plan and the centre came into operation once the facilities were handed over to PLOCAN by Red.es towards the end of the year.

The pictures below show the CDTICMar infrastructures:



Illustration 13. CDTICMar facilities in the PLOCAN offices

The CDTICMar offers:

- A physical space, the infrastructures and support necessary for running tests on products associated with the marine maritime sector.
- An information and dissemination platform for conducting practical demonstrations of these products.
- A meeting point for companies of the marine maritime ITC sector to foster collaboration, the transfer of knowledge and for sharing innovation among them.

An air-land-sea connection point with the infrastructure of the Canary Island Oceanic Platform: the test bed, the platform itself and its on-shore base.

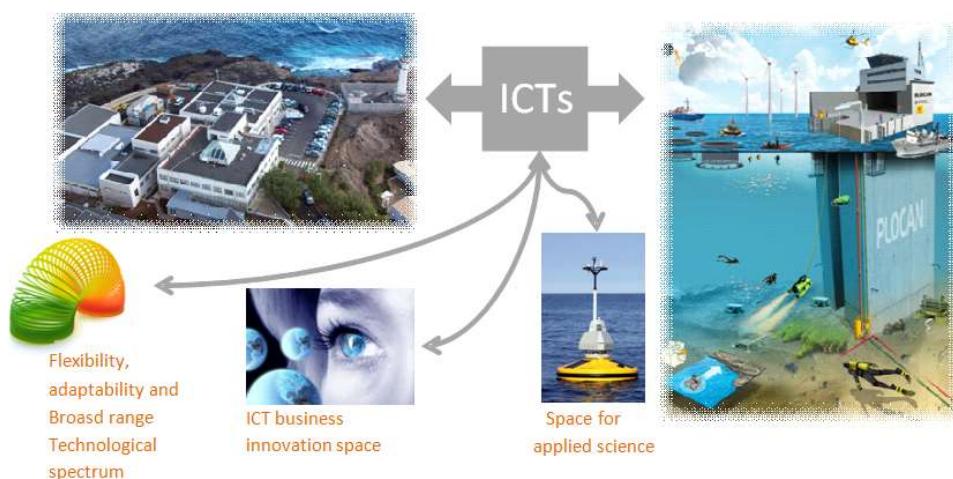


Illustration 14. Specialist two-way, land-sea communications service

The centre comprises the following infrastructures:

- Integrated Communications Centre (ICC). The centre acts as a land-sea connection point between the different PLOCAN infrastructures (test bed, off-shore platform and on-shore base). It is fitted with communication technologies including satellite, WiMAX, TETRA and marine band, so it can adapt to the needs of whatever entity wishes to use the CDTICMar.
- Data Processing Infrastructure (DPI). This is the location where the necessary resources are concentrated for processing information from the CDTICMar. It has the capacity to provide cloud services and to host software on virtual servers.
- Demonstration and Training Support Infrastructure (DTI). This encompasses a dissemination and collaboration environment that acts as a space for organising marine-maritime events, training centre, a stage to present commercial products and services linked to the sector and a co-working station to be shared by companies, universities public institutions, suppliers and customers.

The first awareness-raising conference was held in May on maritime surveillance as part of the PERSEUS project. The objective of this session was to detect and characterise submarine acoustic traces using an autonomous surface marine observation vehicle fitted with an array of the latest generation passive submarine hydrophones.

The PLOCAN offices hosted a second awareness-raising session in late July for the main observer entities and other entities, in this case linked to the UNDERWORLD Project that will be described in another section further on. The objective of the session was to assess submarine radio-communications in the Port of Taliarte (controlled environment) using antennas designed specifically for the purpose in the UNDERWORLD project. The session was attended by a representative of Red.es, which co-finances CDTICMar.

c. BERTH AND WAREHOUSES

The dock and warehouses are located in the scientific port of Taliarte. The port has an access ramp to the sea, making vehicle testing operations easier.



Illustration 15. Access ramp to the sea in the port of Taliarte

d. TEST BED

The test bed encompasses the publicly-owned area of sea and land off the north east coast of Gran Canaria. It is an area of approximately 23 Km², reaching maximum depths of 600metres. Its objective is to drive marine-maritime R+D+I and it is used for testing and monitoring all kinds of scientific and technological activity in the marine environment, including marine energy devices, fitted out for observing meteorological and oceanographic parameters and it will have its own electricity and communications infrastructure to feed power and data from the devices on trial at the test bed, back to shore. The test bed is the site for the following activities:

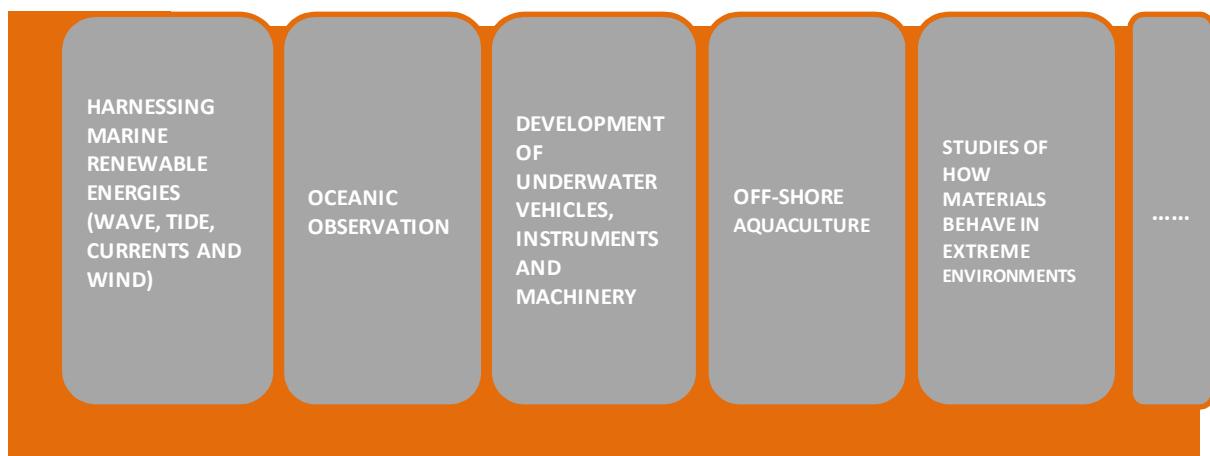


Illustration 16. Test bed activities

The general objective of the test bed is to provide companies and research groups with a chance to demonstrate how the technologies they develop work before marketing them.

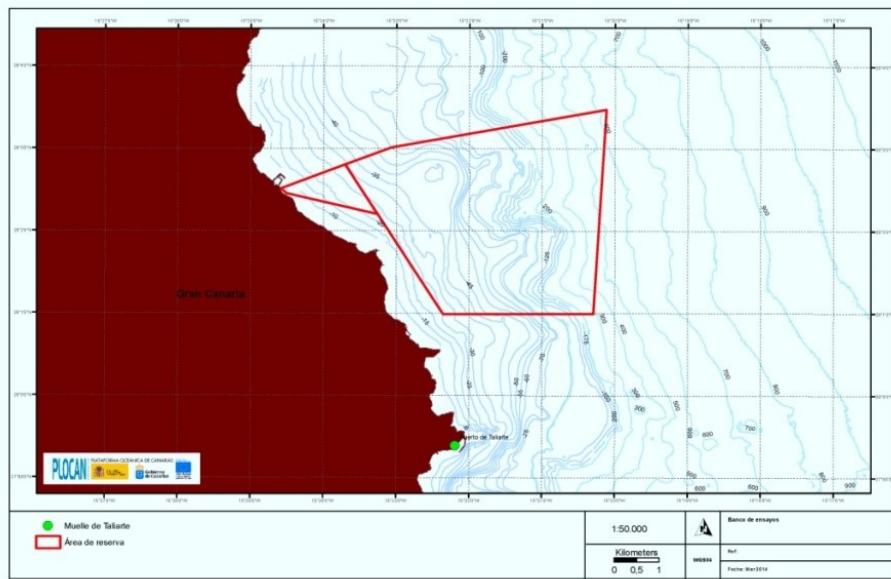


Illustration 17. Test bed reserve area

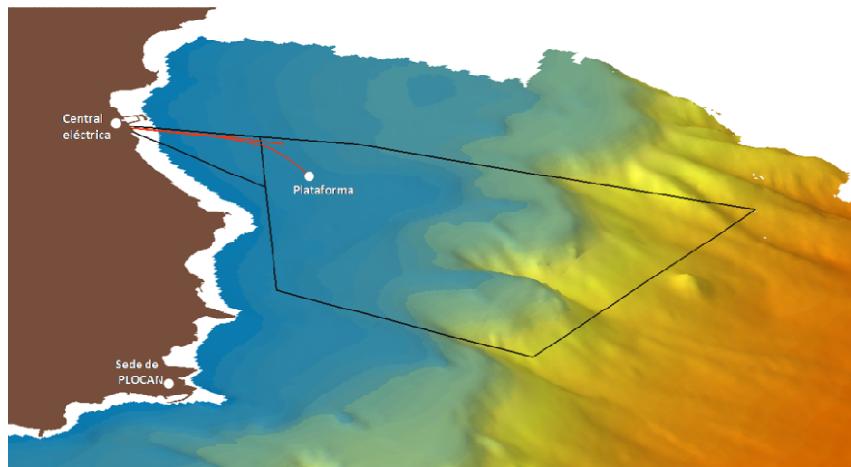


Illustration 18 3-dimensional representation of the test bed area

Environmental characterisation

The environmental characterisation of the test bed area continued in 2015, in order to garner the deepest-possible knowledge of the area that advancing technology makes possible at any one time. A series of activities have been rolled out in the context of the PCMA project, which will be described in another section further on (PCMA project). The list of activities conducted is as follows:

- Environmental impact study
- Measuring submarine noise
- Geo-physical study of the sea beds
- Oceanographic campaign to measure marine physical and chemical parameters
- Measuring marine currents
- A study of the levels of the electric and magnetic field
- A study of the presence of cetaceans and turtles

Generating electricity on the test bed

The application was modified in September 2015 to authorise the generation of electricity at sea and the application was filed with the MINETUR (Department of Energy Policy and Mines, MINETUR) pursuant to Royal Decree 1028/2007.

The application includes generating electricity using experimental technologies relating to off-shore wind power and wave power, up to a maximum generating power of 15 MW.

This procedure is currently on-going and it is expected to be completed in the course of the first six months of 2016.

Application to be included in the specific remuneration regime

By virtue of additional provision six of Order IET/1459/2014, in December, PLOCAN applied to MINETUR to have its experimental facility included in the specific remuneration regime, which will enable PLOCAN to receive financial remuneration for the electricity generated that is at least similar to the remuneration paid for wind energy in the Canary Islands.

IECOM and ETS agreements

As it was impossible to build the PLOCAN electricity and marine communications infrastructure (IECOM) and the Submarine Transformer Station and Equipment for tracking the concurrent operation of new marine electricity generating devices from the environmental standpoint (ETS) in 2015 so the corresponding agreements signed between PLOCAN and MINECO for financing these infrastructure with funds from the ERDF Operational Programme Technology Fund were revoked.

Testing devices

Two devices were moored on the test bed for trials in 2015. The first of these was part of the Undigen + project (UNDIGEN Marine Autonomous System, Collaboration Challenges call for projects 2014) that will be described in the projects section of this report.



Illustration 19. Transporting the device from Puerto de la Luz to the PLOCAN test bed

The second device was moored by Finnish company WelloOy with the help of PLOCAN. The prototype wave-power converter called Penguin IIunder went sea trials in October and was then taken to the dock at Taliarte for the processes of adjustment and fine tuning to be done to rectify it and prepare it for new sea trials in 2016. In this initial stage, the mechanical behaviour of the device was studied, while later stages will assess the behaviour of the electricity generating system.



Illustration 20. Device in the port of Taliarte and moored on the PLOCAN test bed

e. OCEANIC OBSERVATORY

The oceanic observatory managed by PLOCAN has three complementary focuses:

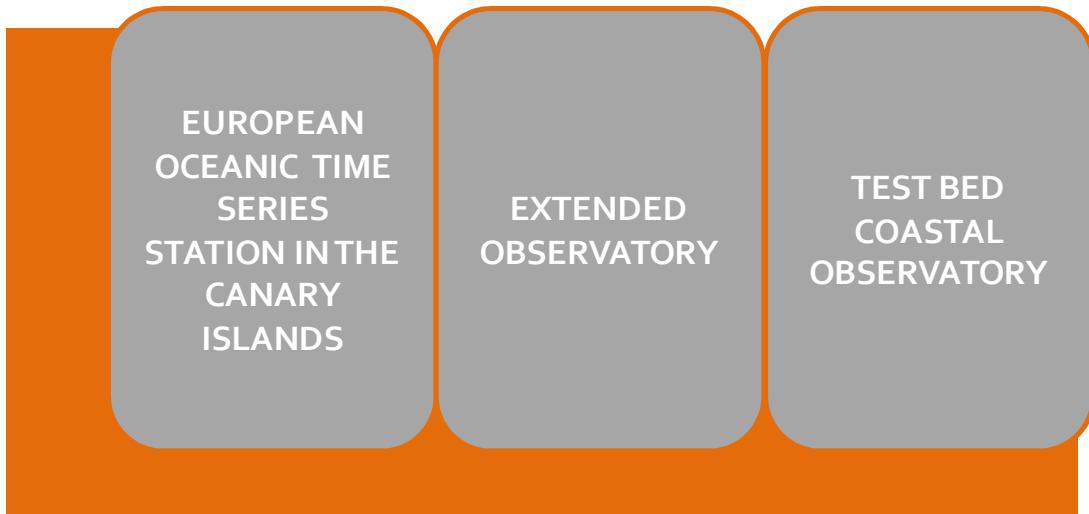


Illustration 21. PLOCAN oceanic observatory



Illustration 22 PLOCAN oceanic observatory

On the one hand, it comprises the ESTOC station (European Oceanic Time Series Station Canaries), located strategically at latitude 29°10'N and longitude 15°30'W where it takes part in seasonal campaigns. It is located off-shore, close to the up-welling, in a terminal region of the arrival of intermediate waters and in the eastern part of the North Atlantic sub-tropical gyre. It is an area of transit for lenses of Mediterranean waters, located on the same latitude as the BATS station (allowing a comparison between the two sides of the ocean) and has relatively easy access due to its proximity to the Islands. Over the years, it has proven the importance of its position for monitoring the variability of the distribution of masses of water in the area, and therefore, in circulation processes of the Atlantic Ocean, and of the global Ocean as a whole.

The ESTOC observatory currently consists of an oceanographic buoy and a mooring line. Both the electronic system and the design of the mooring were developed by PLOCAN personnel. This observatory is anchored at a depth of 3610m and is comprised of four levels of observation, an atmospheric level (3m above sea-level) and three oceanic levels (surface, 100, and 150m). The deployment of this mooring allows atmospheric and oceanographic variables to be measured in real time (hourly resolution) at sea, which are then transmitted by satellite, also in real time. With respect to the atmospheric level, this measures barometric pressure, air temperature, relative humidity and wind velocity and direction, precipitation and photo-synthetically active solar radiation. Hydrographic variables like temperature, salinity and bio-geo-chemical variables like dissolved oxygen, chlorophyll, and pH are measured at the surface level of the water column. At sub-surface levels, other hydrographic variables like temperature, salinity and currents are measured, along with bio-geo-chemical variables like dissolved oxygen, chlorophyll, turbidity and nutrients. Sub-surface observations can be displayed once the mooring is recovered.

PLOCAN continued its strategy of monitoring the ESTOC station in 2015, deploying the buoy/mooring during the "PLOCAN 1-2015" campaign that took place between the 18th and the 21st of May aboard the Oceanographic Vessel "Angeles Alvariño", in collaboration with the Spanish Oceanographic Institute.

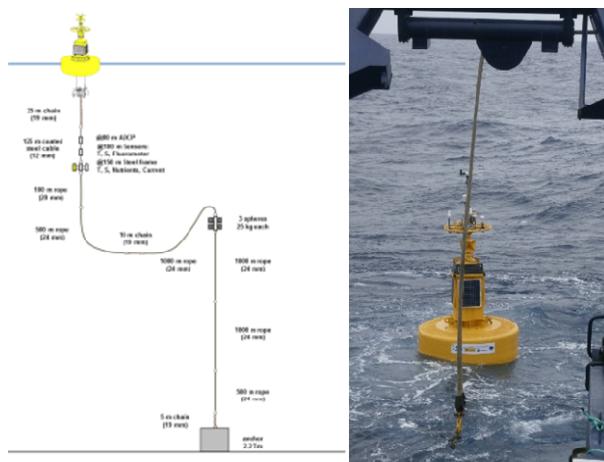


Illustration 23. General schematic and surface photograph of the ESTOC station

The seasonal "in situ" sampling of the ESTOC station water column was also performed during the mission, down to a depth of 3,500m using a CTD (instrument for measuring pressure, temperature and conductivity) with a water acquisition system (rosette) that allows water to be collected at different depths (24 depth levels). The water samples collected by PLOCAN and two groups from the University of Las Palmas de Gran Canaria (Environmental Quality and Marine Chemistry) are used for quantifying dissolved oxygen, CO₂ system variables, nutrients (nano-molar and micro-molar concentrations), aluminium and pigments. The samples are analysed in the PLOCAN and ULPGC on-shore laboratories. A NOAA drifter buoy was also launched to study sub-surface currents in the ESTOC environment as part of the collaboration work with this institution that has been on-going since 1998. On the way out to the coastal observatory, 6 XBT (eXpandable Bathi-Thermograph) probes were launched to measure variations in temperature with depth en route between the deep observatory and the deepest coastal station. Some CTDs (SIS repaired, Idronaut ULPGC previously used on the test bed) were also checked against the CTD installed on the rosette that is properly calibrated, in order to check the measurements taken before or to check the arrangement.



Illustration 24. Deploying oceanographic instruments during the ESTOC campaign

The ESTOC observatory forms part of the European network of fixed deep ocean observatories (over 1000m deep) as part of the European FP7 project FixO₃ (Fixed Point Open Ocean Observatories). Part of this project (which will be described in the projects section) is a work package led by PLOCAN to organise and arrange the trans-national activities to provide access to the observatories that open up their infrastructures to positively-assessed interested users. PLOCAN/ESTOC took part in both calls for projects launched and, as a result, there are two projects that will start implementation on ESTOC in 2016. In particular, the German University of Oldenburg's project to test a sensor in the sub-surface zone and the Portuguese University of Aveiro to install bases for larvae at four different depths. The data arriving almost in real time is displayed by a web application that allows the measurements generated by the sensors to be monitored in real time. The data is submitted for quality control and adapted to the formats established for their distribution in order to meet the international standards described in the Global Earth Observation System of Systems (GEOSS).



Illustration 25. ESTOC station data display portal

The second operation took place between the 24th and the 26th of September aboard the Oceanographic Vessel "Angeles Alvariño" in collaboration with the Spanish Oceanographic Institute. The buoy and the mooring down to 150m were recovered in September. Some difficulties arising during the operation

meant that the mooring could not be re-deployed on ESTOC. The "in situ" sampling of the station was also performed throughout the water column and after recovering the mooring, a NOAA drifter buoy was launched before leaving the ESTOC position. A third operation was conducted in October aboard the oceanographic vessel Ángeles Alvariño, successfully deploying the ESTOC buoy and mooring.

Different PLOCAN areas of interest have also been monitored during this period, using gliders. On the one hand, two seasonal missions were carried out at the ESTOC observatory ESTOC (ESTOC_2015_1 and ESTOC_2015_2) to collect temperature, salinity, dissolved oxygen, chlorophyll and turbidity data. These campaigns last approximately three weeks and they were carried out in summer and autumn, the first one between the 31st of August and the 16th of September, and the second one between the 27th of October and the 16th of November 2015.

During the first mission lasting 17 days without interruption, a total distance of 45 kilometres were covered in waters to the north east of the island of Gran Canaria. The autonomous submarine device, piloted remotely by technical personnel from PLOCAN and fitted with sensors for measuring the bio-geo-chemical parameters of the sea water such as temperature, dissolved oxygen, conductivity, turbidity, chlorophyll, etc., performed a total of 130 profiles through the water column at a depth of 1000 metres. Over one million data were collected on each of these bio-geo-chemical variables. The data is used to continue feeding the time series study that has been running since 1994 at the ESTOC oceanographic station with different devices and means, and which now represents the deep node of the PLOCAN observatory, while also providing direct collaborative support to the RAPROCAN programme led by the Spanish Oceanography Institute's (IEO, in Spanish) Canary Island Oceanographic Centre.

PLOCAN's oceanic environment monitoring activities using cutting edge technology like gliders, is part of the regional contribution to the major international ocean observation programmes, in this case, channelled through regional, national and international research and development initiatives in which PLOCAN takes part, including FixO3, AtlantOS, ESTRAMAR, R3M and EGO.

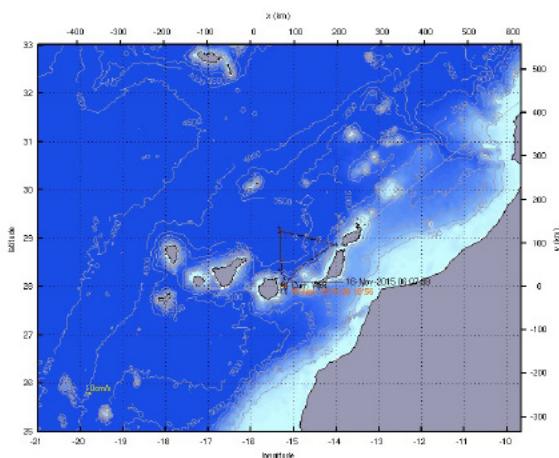


Illustration 26. Track of the ESTOC mission with glider

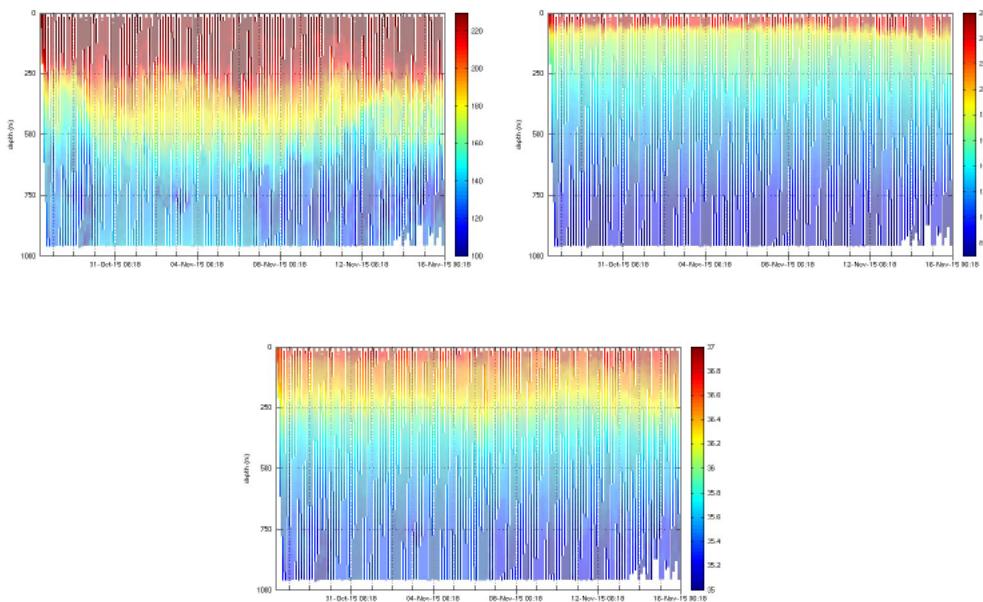


Illustration 27. Data display graphics from glider missions

Data from glider missions can be displayed via a web app similar to the one described for the ESTOC oceanic observatory.

The PLOCAN observatory on the other hand, is comprised of the sensors that monitor the test bed and what we call the “extended observatory”, comprising the operating areas of the gliders in and between the two locations (test bed and ESTOC).

Five stations of the PLOCAN coastal observatory were also sampled (test bed) to perform an environmental check on it. Apart from the aforementioned variables, this included hydro-carbon sampling. Given their proximity to the coast, these missions only lasted one day; one was run in September and another in December. These samples are analysed in the PLOCAN and ULPGC on-shore laboratories.

f. SUBMARINE INSTRUMENT AND VEHICLE BASE (VIMAS)

The submarine instrument and vehicle base includes glider type submarines vehicles and ROVs (*Remotely Operated Vehicle*), along with two support vessels, a LARS device and a hyperbaric chamber.



Illustration 28 PLOCAN UNO light vessel

PLOCAN UNO is a vessel that is adapted to the specific needs of PLOCAN such as transporting containers and oceanographic operations. It is 11.84m long with a 20 m² work deck. PLOCAN DOS is 5.20m long and it is used as an auxiliary vessel in small operations in the area between the peninsulas of La Isleta and Gando.

PLOCAN also has other highly specialised equipment such as:

<p>Hiperbaric chamber Mod. IB-180 Year: 2015 Manufacturer: IBERCO (Spain)</p>	
<p>LARS (Launch and Recovery System) Mod. LITE compact Year: 2015 Nº series: 18846 Manufacturer: POMMEC (Holanda)</p>	
<p>Glider Mod. SLOCUM G2-Deep (1000 m.) Year: 2010 Nº series: 196 Payload: SBE-CTD, Optode-DO, Wetlabs Puck Chl-A/Turb and Doppler RDI Manufacturer: TeledyneWebbResearch (USA)</p>	
<p>Glider Mod. SLOCUM G2-Deep (1000 m.) Year: 2014 Nº series: 492 Payload: SBE-CTD, Optode-DO, Wetlabs puck Chl-A/Turb. Manufacturer: TeledyneWebbResearch (USA)</p>	

Glider
Mod. SPRAY Deep-1000
Year: 2007
Nº series: 501
Payload: SBE-CTD, SBE-DO, SeaPointChl-A and Turb.
Manufacturer: Bluefin Robotics (USA)



ROV
Mod. SeabotixVlbv-950 (950 m.)
Year: 2014
Nº series: EBR-1000-0614-066
Payload: Bowtech camera HD b/n, Bowtech HD colour camera, TritechMicron MK3 sonar, articulated arm 2GL.
Manufacturer: Seabotix (USA)



ROV
Mod. PraesentisBlipper-AT (150 m.)
Year: 2006
Nº series: BL-005
Payload: HD colour camera.
Manufacturer: Praesentis (ESP)
NOTE: discontinued



The technical team working in the VIMAS area are given regular training in the different technologies currently in the market. In October, they attended a 3-day course on SeaExplorer technology in the facilities of German company ALSEAMAR in Aix-en-Provence (France) co-ordinated by Grafinta SA. This technology is the only one of its kind to be developed in Europe.



Illustration 29. Training session on SeaExplorer

4. ORGANISATIONAL STRUCTURE (GOVERNING BODIES AND COMMITTEES)



Illustration 30. Organisational structure of the Consortium

The **Board of Governors** is the top governing and administration body of the Consortium, comprising a chairperson, deputy chair and members. The posts of chair and deputy chair alternate between MINECO and the Government of the Autonomous Region of the Canary Island for a term of two years. Member represent MINECO and the Canary Island Government (four representatives of each institution). The secretary, appointed by the Board of Governors itself, attends the meetings as does the director of the infrastructure.

The powers of the Board of Governors include laying down guidelines and the general framework for preparing the project, setting the rules, guidelines and general criteria for the actions and operations of the Consortium, approving the form of management that should govern the attainment of its ends and

approving the Consortium's annual budget, proposed by the Executive Committee, along with the annual accounts and the settlement of the budget from the previous year.

The Board of Governors meets in ordinary session twice a year and in extraordinary session at the initiative of the chairperson, or whenever either of the two institutions represented requests a meeting. The Chairperson of the Board of Governors is the maximum representative of the Consortium.

The last meeting of the year was held in the PLOCAN offices under the chairmanship of the director of the Canary Island Research, Innovation and Information Society Agency, Manuel Miranda Medina. The deputy minister of the President' office, José Miguel Barragán Cabrera, the deputy minister of Finance and Planning, Luis Padilla Macabeo, and the director general of Industry and Energy of the Canary Island Government, Erasmo García de León all joined as members of the Board of Governors at this meeting. The meeting was also attended by the director general of Innovation and Competitiveness of MINECO, María Luisa Castaño Marín, deputy director general of Scientific and Technological Infrastructure Planning, José Ignacio Doncel Morales and the head of the Department of Scientific and Technological Infrastructure Planning, Ana Aricha Yanguas. During their visit to the facilities, the members of the Board had the opportunity to meet the PLOCAN staff.



Illustration 31. Members of the Board of Governors with the PLOCAN staff

After the meeting, the members of the Board visited the construction site of the Platform at the Nelson Mandela dock, in the port of La Luz and Las Palmas.



Illustration 32. Visit to the platform building site in the port of La Luz and Las Palmas by members of the Board

The **Executive Committee** is a governing body created to monitor and implement the activities of the Consortium, comprising four representatives of the Canary Island Government, at least one of whom must be a member of the Board of Governors, and four representatives from MINECO, at least one of whom must also be a member of the Board of Governors. The chairmanship and deputy chairmanship of the Committee alternates in the same manner as the Board of Governors, bearing in mind that the chairmanship of both bodies cannot be held by the same institution at the same time.

The Executive Committee is the body responsible for proposing the Consortium's annual budget, annual accounts and the settlement of the budget for the previous year to the Board of Governors, and for proposing an annual plan of actions and projects and the scientific programme to be implemented in the infrastructure.

The Executive Committee holds an ordinary meeting at least once a quarter, and it holds extraordinary meetings whenever it is convened by its chairperson, or whenever one of the institutions represented so requests.

The **Socio-economic Activity Advisory Committee** (CASE, as it is known in Spanish) is an advisory body to the Consortium. Its objective is to advise about PLOCAN's scientific and technological activities, programmes and plans and to propose future actions that can focus the work of the Consortium to contribute to the sustainable socio-economic development of oceanic activities.

The CASE is comprised of a group of people of recognised repute in the socio-economic fields related to the Consortium's aims and activity. The CASE's functions include preparing an advisory report every four years on the future opportunities, prospects and capacities of the centre. This report is presented to the Board of Governors in order to help them in the strategic orientation of the centre.

The CASE held its sixth meeting in the PLOCAN offices on the 15th of July. During the meeting, the annual activities report from the previous year was reported to the members of the committee, they were informed about progress on the construction of the platform and they worked on the report that the committee is preparing on PLOCAN's strategic orientation in the socio-economic field.



Illustration 33. CASE meeting in the PLOCAN offices

The Scientific and Technical Advisory Committee (COCI, as it is known in Spanish) is another advisory body to the Consortium. Its objective is to advise on PLOCAN's scientific and technological activities, programmes and plans, propose future actions that can enhance the quality and scope of the work and to organise and propose offers of access to the platform by external scientists and make the final selection of these.

The COCI is comprised of people of recognised international repute in fields related to the aims and activities of the Consortium. Its members were appointed by the Board of Governors, at the proposal of the institutions making up the Consortium.

The COCI's functions include preparing an advisory report every four years on the centre's future opportunities, prospects and capacities, which is put to the Board of Governors to help it in the strategic orientation of the centre.

The COCI held its sixth meeting in the offices of the Canary Island Government in Madrid on the 4th of May. During the meeting, the director and the general manager of PLOCAN made a presentation of the activities carried out in 2014, the told members of the committee about the platform construction, they reviewed the infrastructure report written by MINECO's Outstanding Infrastructures Advisory Committee and they laid the foundations for preparing the next strategy plan.



Illustration 34. Members of the COCI after the meeting

5. PEOPLE IN PLOCAN

Eleven people joined the organisation in 2015, answering the call for job vacancies. Six of these were linked to projects, three as members of staff and two to work on a programme aimed at promoting youth employment and the implementation of the Youth Guarantee in R+D+i subsidised by the Central Government.

Arrangements were made during the year to bring in a manager of the economic-administrative areas to head up the scientific-technological area and the selection process was started to bring in a new manager to run the economic-administrative area.

At 31st December 2015, the PLOCAN team was made up of forty three people. Twenty nine of these were members of staff, eleven were on R+D+i project contracts and three belonged to the training plan. The diagram below shows the internal organisational structure of the Consortium, with three different areas that the Consortium personnel are divided into.

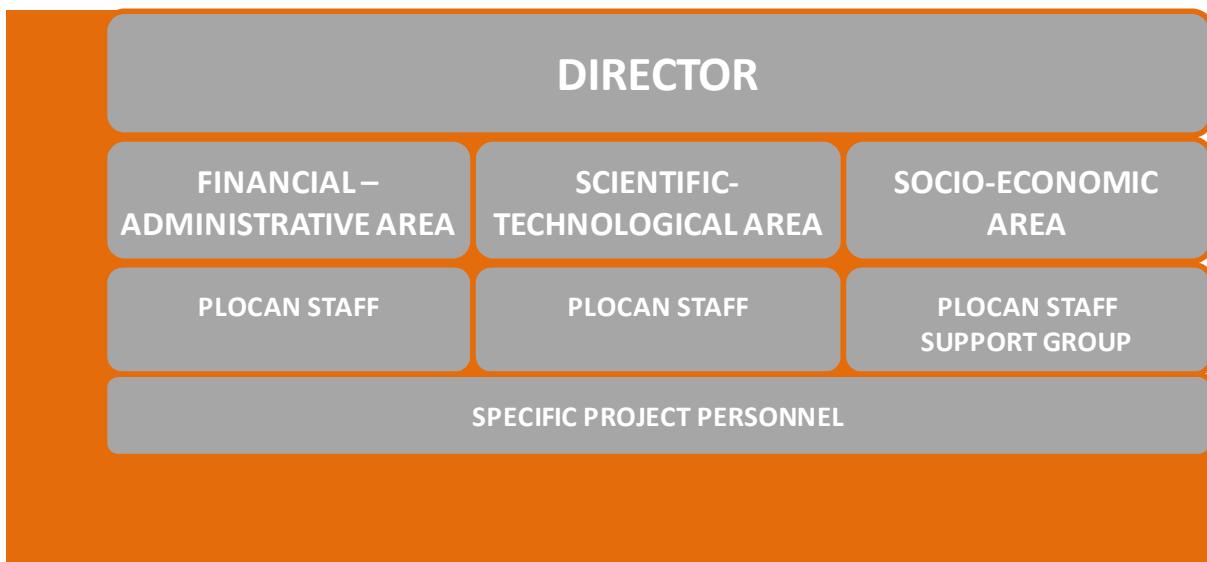


Illustration 35. Organisational structure of the PLOCAN Consortium

Furthermore, as shown by the figure above, the organisation has a support group included in the socio-economic area. This group is made up of staff from the former Canary Island Institute of Marine Sciences that the Canary Island Government has temporarily transferred to PLOCAN to provide support in these initial stages of the infrastructure to offset the problem they have faced in building up the staff at the rate that was initially envisaged.

The illustration below offers information about PLOCAN staff (it does not include the support group transferred to PLOCAN temporarily):



Illustration 36. People in PLOCAN (end of 2015)

The graph below shows the age distribution of PLOCAN personnel at the end of 2015. Most of the staff falls in the age range of between thirty and forty four years old.

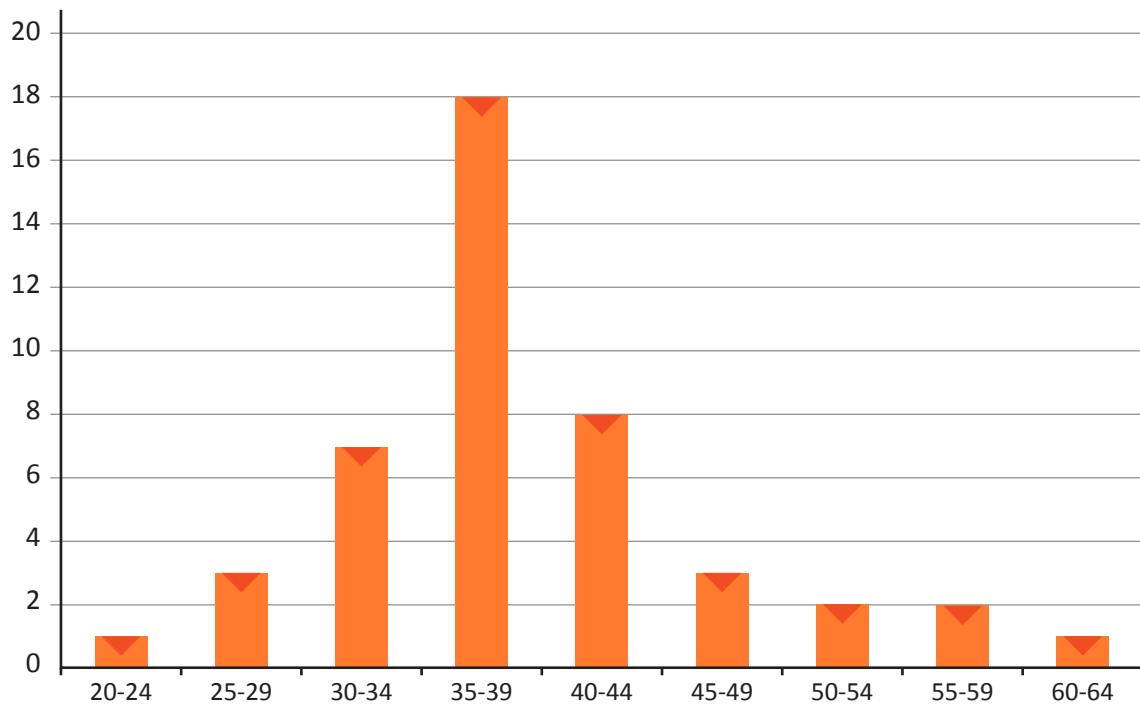


Illustration 37. Age distribution of PLOCAN personnel

The following graphs show the person unit/month ratio at the end of 2015 on the different levels of the organisation (personnel on the staff) and the relationship between the person unit/month for personnel on project contracts and the Consortium staff personnel.

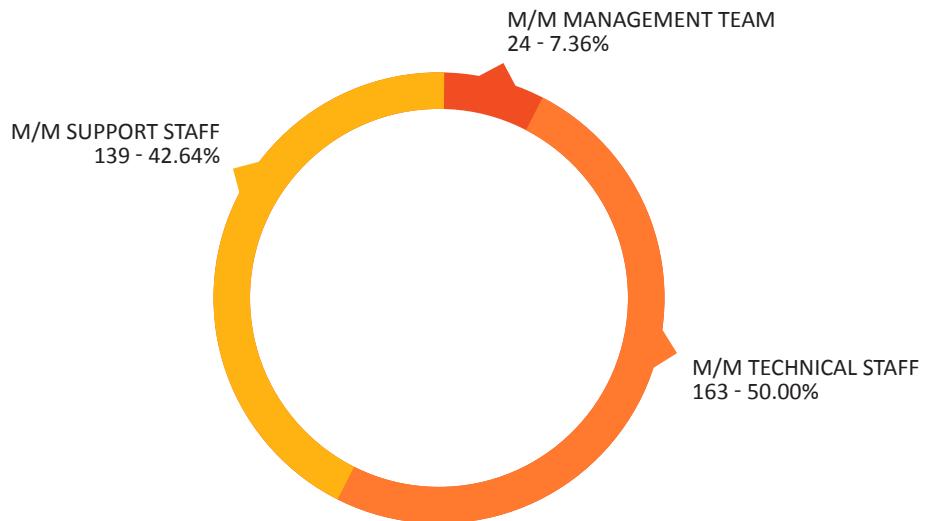


Illustration 38. Person unit/month ratio on the different levels

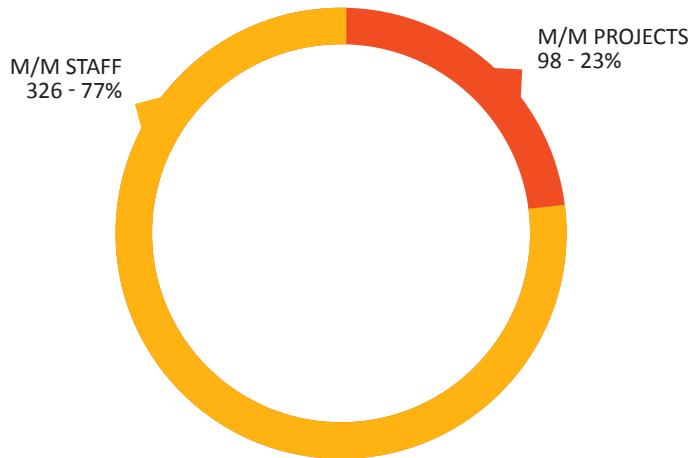


Illustration 39. Relationship person unit/month for projects and staff

6. PROJECTS IMPLEMENTED

The objective of PLOCAN's participation in projects during the construction phase is to promote the potential of the infrastructure in a broad range of scientific and technological disciplines, in an attempt to act as a meeting point and an international benchmark. Another objective is to consolidate a national and international scientific community of excellence, including tech-based companies, to allow a transfer of know-how between these sectors to accelerate innovation and generate social and economic value. That is why, as will be seen in the statistics included in this chapter, PLOCAN's main activity focuses on international projects, approximately 70% and in collaboration with the private sector (50% approximately).

A total of twenty three projects were managed in 2015. Five of these were led by PLOCAN and in the remaining eighteen, PLOCAN participated as a partner.

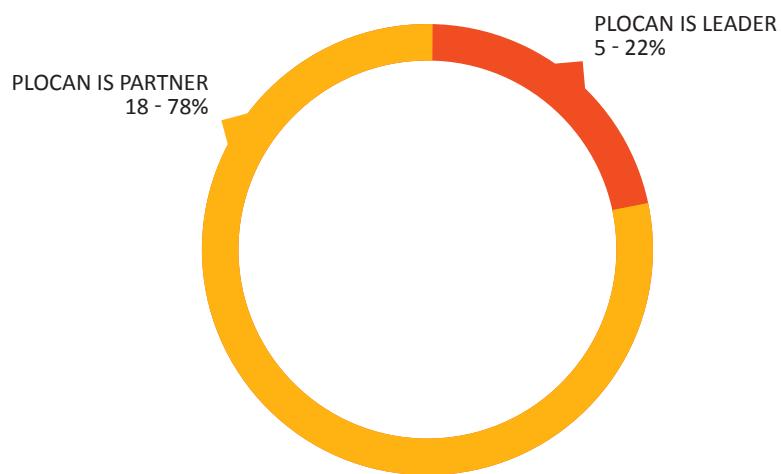


Illustration 40. Role of PLOCAN in the projects carried out in 2015

Seventeen of the projects managed received European funding and six domestic funding.

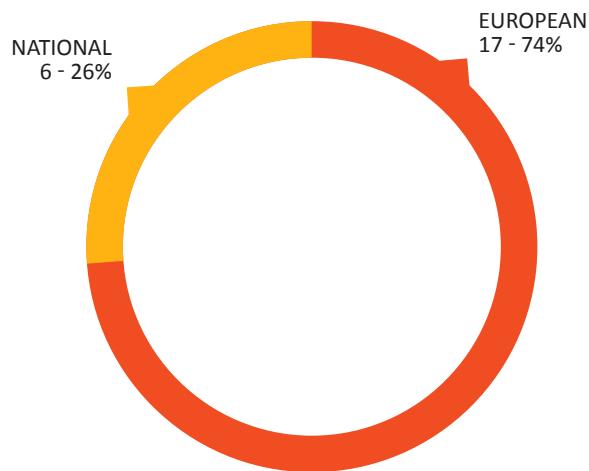


Illustration 41. On-going projects by origin of funding

The graph below shows the amount of funding received by PLOCAN broken down by the origin of the funds.

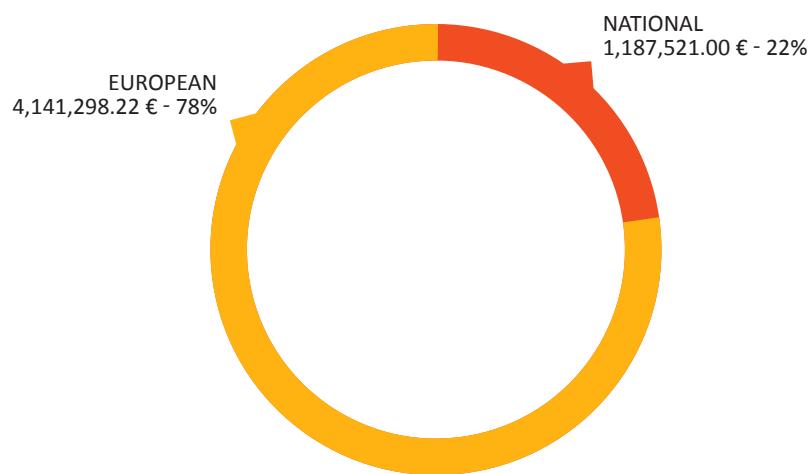


Illustration 42. PLOCAN funding from the projects implemented in 2015

The graphs below provide information about the partners on the active projects in 2015 according to their origin, the kind of institution and partners by specific project.

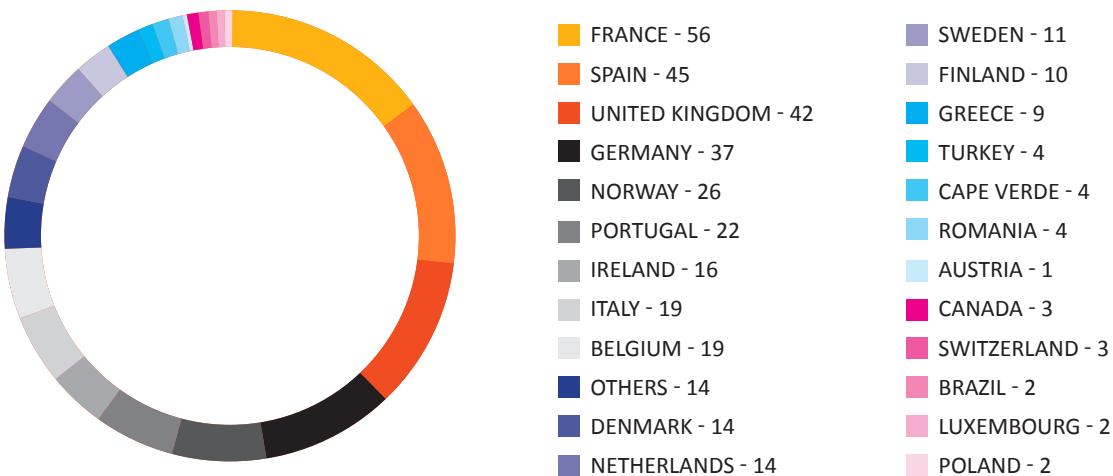


Illustration 43. Project partners by countries

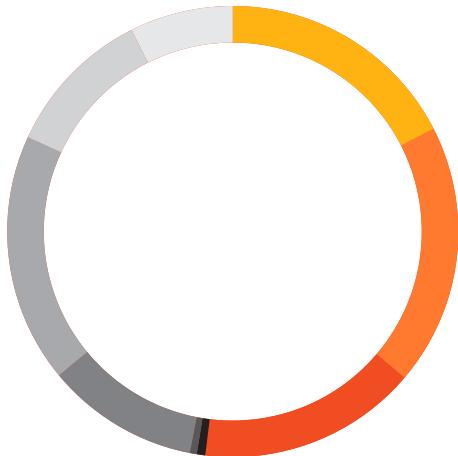


Illustration 44. Project partners by kind of organisation

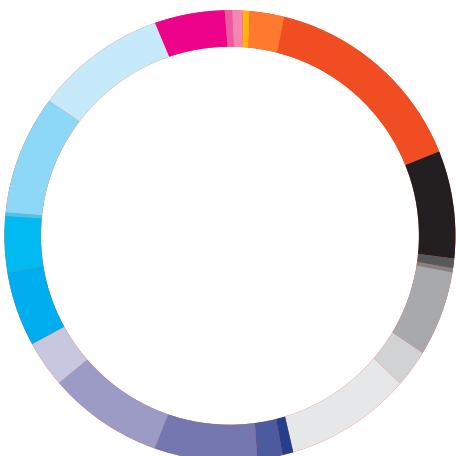


Illustration 45. Project partners by specific project

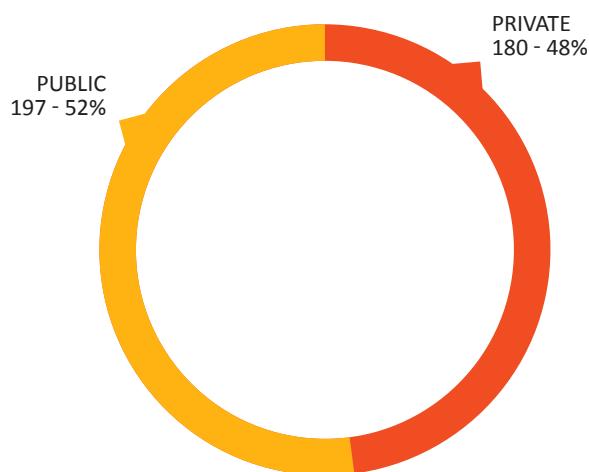


Ilustración 46. Project partners by kind of organization

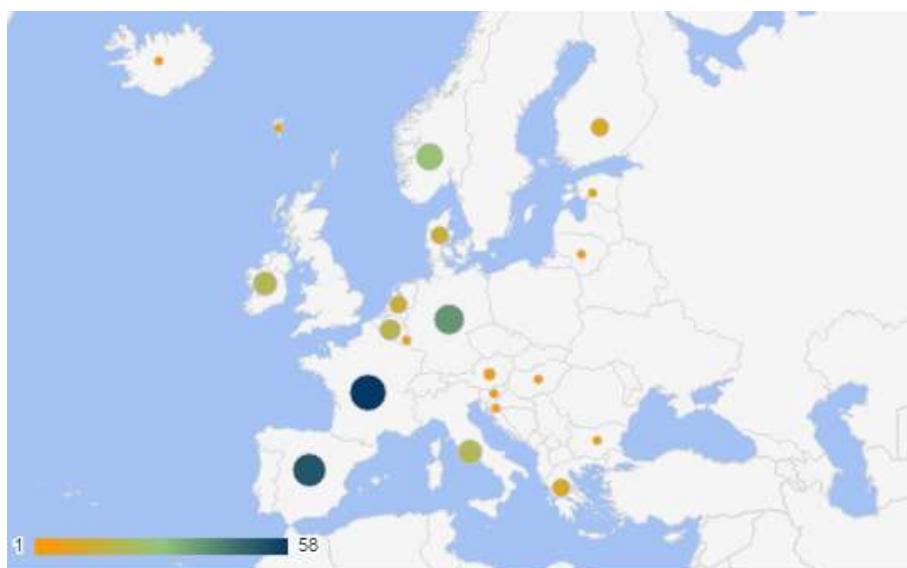


Illustration 47. European distribution of project partners



Illustration 48. Global distribution of project partners

The list and description of the projects managed by PLOCAN in 2015, in alphabetic order, accompanied by a short summary of the most important activities performed within the framework of each one is as follows:

AEIGLIDERS

Installing spectro-photometric pH sensors in un-manned autonomous vehicles (Gliders)

Origin of funding: Agrupaciones Empresariales Innovadoras(AEI) 2015

Participation: Partner

Total project funding: €47,410.00

Funding for PLOCAN: €15,654.00

Percentage of funding: 70 %

The project consists of adapting the SP200 family of spectro-photometric pH sensors to be installed and operate in both surface and submarine gliders. The spectro-photometric pH sensors were developed by Sensorlab SL as highly accurate devices, designed for measuring pH in open waters over periods of several months without the need to calibrate or maintain them. They are mainly used for monitoring climate change.

The solution is to install the pH sensors in un-manned autonomous vehicles, as this allows for much more frequent campaigns and at a far lower cost than conventional oceanographic campaigns.

The project has two major objectives:

- To adapt the technical characteristics of the sensors so that they can be used in un-manned vehicles
- To reduce the cost of the sensors, so that they are more competitive in the market and also to be able to enter into other applications.

The new range of sensors will open up new business opportunities, on the one hand because it will be possible to use them in new applications and on the other because new clients will discover them through the marketing done by the manufacturers of the gliders. There are currently no pH sensors installed in gliders anywhere in the world and there is certainly interest among the scientific community.

The work tackled in 2015 in the implementation of the project included:

- Design studies of the component sub-systems for enhancing the useful load (with respect to sensors)
- Improved version of the pH sensor
- Laboratory tests run to verify the stability and repeatability of the pH sensor measurements
- Preliminary electro-mechanical installation of the sensors in a Wave Glider SV3
- In the field of project information and dissemination, the project was presented as part of the GliderSchool 2015 by the sensor manufacturer SensorLab.

AORAC-SA

Atlantic Ocean Research Alliance Support Action

Origin of funding: H2020-BG-2014-1 / BG-14-2014

Participation: Partner

Total Project funding: 3.447.000,00 €

Funding for PLOCAN: 247.000,00 €

Percentage of funding: 79,36 %

The Atlantic Ocean Research Alliance Coordination and Support Action (AORAC-SA) is designed to provide scientific, technical and logistical support to the European Commission in developing and implementing trans-Atlantic Marine Research Cooperation between the European Union, the United States of America and Canada. The Coordination and Support Action (CSA) is carried out within the framework of the Atlantic Ocean Research Alliance as outlined in the Galway Statement on Atlantic Ocean Cooperation (May 2013). Recognising the evolving nature of the Atlantic Ocean Research Alliance, the hallmark of this proposal is that it is flexible, responsive, inclusive, efficient, innovative, value-adding and supportive.

To support the Commission in negotiations with the USA and Canada on trans-Atlantic Ocean Research Cooperation, the AORAC-SA support and governance structure comprises a Secretariat and Management Team, guided by a high-level Operational Board, representative of the major European Marine Research Programming and Funding Organisations as well as those of the USA and Canada. This structure is further able to draw on significant marine research expertise and experience through its partner organizations.

The CSA, reporting to the Commission representatives of the Atlantic Ocean Research Alliance, will be responsible for the organisation of expert and stakeholder meetings, workshops and conferences required by the Atlantic Ocean Research Alliance and related to identified research priorities (e.g. marine ecosystem-approach, observing systems, marine biotechnology, aquaculture, ocean literacy, seabed and benthic habitat mapping), support actions (e.g. shared access to infrastructure, dissemination and knowledge transfer, establishment of a knowledge sharing platform) and other initiatives as they arise, taking into account related Horizon 2020 supported trans-Atlantic projects (e.g. BG1, BG8 and BG13) and on-going national and EU collaborative projects (e.g. FP7).

The project kick-off meeting was held in March. The activities undertaken by PLOCAN as the leader of WP5 were:

- Prepare a detailed document by way of deliverable (D5.2) on the activity and capacities in Europe with respect to Oceanic Observation, including the main projects and initiatives in this context
- Networking and capacity-building activities with the co-ordinators of the main European projects (i.e. AtlantOS) and initiatives (i.e. EuroGOOS) concerning oceanic observation in order to optimise efforts and generate collaborative synergies in the Atlantic basin
- In the area of information and dissemination of the project, PLOCAN has printed an explanatory brochure, it took part in the GAIC-2015 conference, in EU-Canada WorkshopSession sonOceansheld in Barcelona and in the Rio de Janeiro meeting promoted by the EC with regard to

the strategic co-operation agreement with Brazil in Atlantic marine co-operation matters entitled "Open science, open innovation, openness to the world".

ATLANTOS

Optimizing and Enhancing the Integrated Atlantic Ocean Observing System

Origin of funding: H2020-BG-2014-2 / BG-08-2014: Developing in-situ Atlantic Ocean Observations for a better management and sustainable exploitation of the maritime resources

Participation: partner

Total project funding: 20.652.921,00 €

Funding for PLOCAN: 502.231,25 €

Percentage of funding: 100 %

The overarching objective of AtlantOS is to achieve a transition from a loosely-coordinated set of existing ocean observing activities to a sustainable, efficient, and fit-for-purpose Integrated Atlantic Ocean Observing System (IAOOS), by defining requirements and systems design, improving the readiness of observing networks and data systems, and engaging stakeholders around the Atlantic; and leaving a legacy and strengthened contribution to the Global Ocean Observing System (GOOS) and the Global Earth Observation System of Systems (GEOSS). AtlantOS will fill existing in-situ observing system gaps and will ensure that data are readily accessible and usable. AtlantOS will demonstrate the utility of integrating in-situ and Earth observing satellite based observations towards informing a wide range of sectors using the Copernicus Marine Monitoring Services and the European Marine Observation and Data Network and connect them with similar activities around the Atlantic.

AtlantOS will support activities to share, integrate and standardize in-situ observations, reduce the cost by network optimization and deployment of new technologies, and increase the competitiveness of European industries, and particularly of the small and medium enterprises of the marine sector. AtlantOS will promote innovation, documentation and exploitation of innovative observing systems. All AtlantOS work packages will strengthen the trans-Atlantic collaboration, through close interaction with partner institutions from Canada, United States, and the South Atlantic region. AtlantOS will develop a results-oriented dialogue with key stakeholders communities to enable a meaningful exchange between the products and services that IAOOS can deliver and the demands and needs of the stakeholder communities. Finally, AtlantOS will establish a structured dialogue with funding bodies, including the European Commission, USA, Canada and other countries to ensure sustainability and adequate growth of IAOOS.

The project kick-off meeting was held in Kiel. The main tasks performed in 2015 were:

- Preparing a technical document for acquiring the specific equipment, including sediment traps and zooplankton and phytoplankton collectors(WP3)
- Running seasonal glider missions between PLOCAN's coastal and deep-water observatories in order to maintain the time series observations in the area(WP3)
- Participation in EGO (Everyone'sGlidingObservatories) Committee follow-up meeting (WP3)
- Contribution to the AtlantOS Data Management document (WP7)

- Participation in seminar(WP6)
- Preparation of an informative brochure on the project

BIODIVERSA3

BiodivERsA3: consolidating the European Research Area on biodiversity and ecosystem services

Origin of funding: H2020-SC5-2014-one-stage / SC5-09-2014: Consolidating the European Research Area on biodiversity and ecosystem services

Participation: partner

Total project funding: 11.999.980,50 €

Funding for PLOCAN: 132.069,96 €

Percentage of funding: 34,49 %

The loss of biodiversity and degradation of ecosystems jeopardize the sustainable provision of ecosystem services and are major scientific and societal challenges. Addressing this challenge and providing scientific support to stakeholders and policy makers requires a coherent interdisciplinary research framework, with coordinated strategies and programmes at the national, regional and international levels, which are the relevant scales for many biodiversity issues.

By networking 32 funding agencies from 18 countries, BiodivERsA3 aims to strengthen the ERA on biodiversity. Building on the previous experiences of the projects BiodivERsA1&2 and NetBiome, BiodivERsA3 will promote and support coordinated pan-European research on biodiversity and ecosystem services. It will strengthen research and research programmes coordination with the ultimate aim to provide policy makers and other stakeholders with adequate knowledge, tools and practical solutions to address biodiversity and ecosystem degradation.

The objectives are to:

- Enhance the capacity of the network to coordinate research programmes on biodiversity and ecosystem services more completely in Europe (including overseas territories) and to increase the international dimension of BiodivERsA activities.
- Develop a strategic, multi-annual vision of the network's priorities, based on ambitious mapping and foresight activities developed in collaboration with key initiatives in the field.
- Design and implement a co-funded call and other joint calls to better integrate research on biodiversity and ecosystem services across Europe.
- Develop a range of other joint activities, in particular alignment of national research programmes for biodiversity and ecosystem services, and activities for promoting mobility and equal opportunities for researchers and reinforcing data sharing.
- Promote effective science-policy and science-society (including sciencebusiness) dialogue during the whole research process

PLOCAN is implementing this project on behalf of ACIISI, because as it is a Cofund ERA-Net, partners have to be funding agencies. The project kick-off meeting was held in Paris from the 26th to the 28th of March 2015. The data base was updated to provide information on bio-diversityprojects and programmes in the

Canary Islands. The call for projects went out on the 14th of May with the participation of the Canary Island Government in 2 stages: pre-proposal and proposal. A project newsletter was published in October.

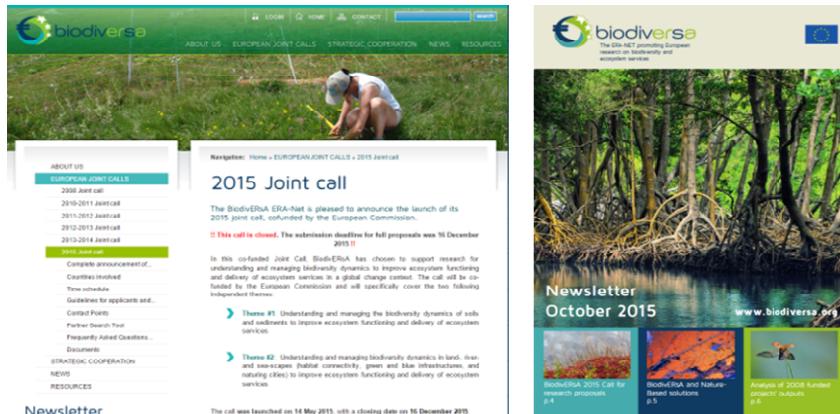


Illustration 49. Image of the call and the Biodiversa newsletter

CANAUTIC

Canaries-Cape Verde leisure sailing co-operation platform. Socio-economic and environmental diagnosis of sailing activities and proposals for planning leisure and sports sailing activities

Origin of funding: PCT-MAC 2007-2013

Participation: Partner

Total Project funding: 160.000 €

Funding for PLOCAN: 36.550 €

Percentage of funding: 85 %

The CANAUTIC project seeks to use collaboration between maritime and marine institutions of the Canary Islands and Cape Verde to foster sustainable regional development by integrating the economic activities of the coastal areas of the Canary Islands and Cape Verde to establish a framework of rational use of the coastal areas based on social, economic and environmental criteria. The project is divided into three distinct phases:

- Phase one: to identify port infrastructures devoted to sailing activities and an environmental and socio-economic diagnosis. The sustainability component will be a study of the use of Renewable Energy in port facilities associated with leisure and sports sailing in Cape Verde and the Canary Islands.
- Phase two: the distinguishing features will be to use maps of the coast, with these focusing on sports and leisure sailing-related uses. Moreover, there will be descriptions of all the sailing connections between the Canary Islands and Cape Verde, which will be fed into the CANAUTIC Web GIS. On the other hand, a CANAUTIC conference is planned.
- Phase three: roll out the CANAUTIC Co-operation Platform and implement a project communication plan.



Illustration 50. CMMM steering committee meeting in the Azores

As part of the CANAUTIC project, the Macaronesia Marine Cluster steering committee met (The Macaronesia Marine Cluster includes institutional, business and scientific-technological stakeholders from Madeira, Azores, Canaries and Cape Verde) in the offices of the Punta Delgada Chamber of Commerce in the Azores in order to plan joint action programmes to foster growth and sustainable employment, in line with the maritime strategy for the Atlantic Ocean zone.



Illustration 51. CANAUTIC conference held in the PLOCAN offices

In September, the PLOCAN offices hosted a conference entitled "Developing water sports in the Archipelagos of the Canary Islands and Cape Verde. Development potential of the nautical sector in the region: promoting joint destinations. Previous co-operation experiences", as part of the CANAUTIC project organised by the Marine Sciences Technology Centre (CETECIMA, as it is known in Spanish).

CANAUTIC is a group of four partners: The Marine Sciences Technology Centre, as the project leader; the Canary Island Oceanic Platform, the University of Las Palmas de Gran Canaria and the Cape Verde Marine and Port Institute. Its objective is to foster Sustainable Territorial Development by integrating the economic activities of the coastal zones of the Canary Islands and Cape Verde, establishing a framework for the rational use of the coastal area based on social, economic and environmental criteria, and

specifically, to forge nautical connections between the archipelagos of Cape Verde and the Canary Islands to reinforce the sector and increase the socio-economic development of archipelagic regions. The conference conclusions highlighted the fact that reinforcing the operational and professional capacity of nautical companies in Cape Verde could turn the archipelago into a magnificent holiday destination for European tourists looking for water sports, beaches and game fishing in the medium term and the development of its nautical potential will enable Cape Verde to attract leisure craft traffic on their way to South America and some of the traffic to the Caribbean as well.

Finally, as part of the project communication plan, the possibility of attending EXPOMAR in Cape Verde was raised, to promote CANAUTIC, strengthen the contacts made at this meeting and to explore future new co-operation actions with entities and institutions from both Cape Verde and from other countries attending the event. A 9 m² stand was hired for this purpose in the Mindelo Trade Fair Centre.



Illustration 52. Gran Canaria delegation at EXPOMAR

CATAPULTA

The Canary Islands Oceanic Platform as a catalyst of innovative marine projects

Origin of funding: Spanish programme for R&D promotion focussed on societal challenges/
Dinamization actions "Europa Redes y Gestores"

Participation: Only partner

Total project funding: 143.000,00 €

Funding for PLOCAN: 143.000,00 €

Percentage of funding: 100 %

The main endpoint of the CATAPULTA project is to deploy PLOCAN's potential to win and consolidate international financing to attract marine and maritime R+D+i to Spain and ensure its consolidation here.

From a strategic standpoint, this will be aimed at:

- Enhancing the capacity-building and management of the number of proposed projects, for both ICTS users and for the PLOCAN infrastructures in the new European Union Framework Programme Horizon 2020 and other international programmes (COSME, Interreg, Eurostars, etc.)
- Fine tuning and bringing specifications in line with international standards and best practises, to improve the quality of the PLOCAN's Integral R+D+i Project Management System, from conception to rationale.

CATAPULTA will run for 3 years with an estimated starting date of 1st January and finishing on 31st of

December 2017. In order to attain the main objective, the project is structured in accordance with the following specific objectives:

1. Develop the area of attracting resources and preparing proposals for international projects for ICTSPLOCAN users
2. Create and roll out a continuous training programme in the European Union's Horizon 2020 Framework Programme and accredit new personnel on an international level in project management
3. Reinforce and optimise the PLOCAN Integral Project Portfolio Management System.

The expected result of these actions is that PLOCAN sees at least a 70% increase in the number of proposals presented to the H202 programme against its participation in the FP7 programme, over the course of the 3 years of the project, both in projects to be hosted by the PLOCAN infrastructure and those aimed at fostering European participation among infrastructure users and that all this translates into at least a 95% increase in proposal approvals.

The selection process for new staff to join the project management office was carried out in 2015, leading to two project managers being hired. Thirteen proposals were presented during the year, 2 of which were accepted. With respect to funding programmes, between 7 and 10 of these were analysed and studied. The managers were given 2 specific training courses for the H2020 programme and also specific training in the regional Interreg-MAC programme.

COLUMBUS

Monitoring, Managing and Transferring Marine and Maritime Knowledge for Sustainable Blue Growth

Origin of funding: H2020-BG-2014-1 / BG-11-2014: Monitoring, dissemination and uptake of marine and maritime research

Participation: Partner

Total project funding: 3.997.488,00 €

Funding for PLOCAN: 49.000,00 €

Percentage of funding: 100 %

We are standing at the dawn of a century that will be largely affected by how we as a society are able to manage our oceans and their resources. Marine and Maritime Research has a critical role to play in developing our understanding of the seas and advance technology so that we can develop their economic potential in a sustainable manner.

The COLUMBUS project intends to capitalise on the EC's significant research by ensuring accessibility and uptake of research Knowledge Outputs by end-users (policy, industry, science and wider society). COLUMBUS will ensure measurable value creation from research investments contributing to sustainable Blue Growth within the timeframe of the project.

Adopting proven methodologies and building on significant past work, COLUMBUS will first identify end-user needs and priorities. It will then set about identifying and collecting "Knowledge Outputs" from past and current EC projects. Rigorous analysis will take place to identify specific applications and end-users. Transfer will be achieved and measured through tailor-made knowledge transfer. All knowledge collected will be made accessible the pre-existing Marine Knowledge Gate.

To achieve the above, COLUMBUS has brought together a multidisciplinary, multi-stakeholder team representing all aspects of the research value chain from funding agencies to end-users. Key strategic initiatives and networks further strengthen and provide a strong vehicle for project legacy. A network of 9 Competence Nodes, each with a "Knowledge Fellow" and support team across Europe will provide the necessary critical mass (470pm of effort) to ensure full thematic and spatial coverage.

COLUMBUS will also carry out strategic actions to enhance the visibility and impact of research to stakeholders and European Citizen's.

Furthermore working with funding agencies and stakeholders, COLUMBUS will examine the feasibility of improved systems and processes to ensure measurable value creation from research.

The *Knowledge Transfer Fellows* (KTF) were selected and hired in 2015. They started their training and their work by gathering knowledge that can be leveraged from marine-environment-related projects financed by the EC (Knowledge Outputs or KO). The first KO gathering exercise was completed using projects financed in "The Ocean of Tomorrow" calls with over 500 KOs gathered that are available on the "Marine Knowledge Gate" web portal.

EMSODEV

EMSO implementation and operation: DEVelopment of instrument module

Origin of funding: H2020-INFRADEV-1-2015-1 / INFRADEV-3-2015: Individual implementation and operation of ESFRI projects

Participation: Partner

Total project funding: 4.470.474,00 €

Funding for PLOCAN: 40.000,00 €

Percentage of funding: 100 %

The EMSODEV (European Multidisciplinary Seafloor and water-column Observatory DEVelopment) general objective is to catalyse the full implementation and operation of the EMSO distributed Research Infrastructure (RI), through the development, testing and deployment of an EMSO Generic Instrument Module (EGIM). This module will ensure accurate, consistent, comparable, regional scale, long-term measurements of ocean parameters, which are key to addressing urgent societal and scientific challenges such as climate change, ocean ecosystem disturbance, and marine hazards. This will result in the increased interoperability of EMSO nodes thanks to the harmonized collection of ocean essential variable time series.

In addition, EGIM will also greatly help optimize the investments and operational efficiency of the EMSO research infrastructure thus improving RI effectiveness and its attractiveness for member states and users, including for industry.

The EMSODEV project started at the end of 2015 with a series of initial management and technical meetings that decided that PLOCAN would study its participation in the call for proposals for a test

deployment of the EGIM module in open water. This module is the main development object of the project.

ENVRI PLUS

Environmental Research Infrastructures Providing Shared Solutions for Science and Society

Origin of funding: H2020-INFRADEV-1-2014-1 / INFRADEV-4-2014-2015: Implementation and operation of cross-cutting services and solutions for clusters of ESFRI and other relevant research infrastructure initiatives

Participation: Partner

Total project funding: 14.683.533,75 €

Funding for PLOCAN: 81.000,00 €

Percentage of funding: 100 %

ENVRIPLUS is a cluster of research infrastructures (RIs) for Environmental and Earth System sciences, built around ESFRI roadmap and associating leading e-infrastructures and Integrating Activities together with technical specialist partners.

ENVRIPLUS is driven by 3 overarching goals: 1) favoring cross-fertilization between infrastructures, 2) implementing innovative concepts and devices across RIs, and 3) facilitating research and innovation in the field of environment to an increasing number of users outside the RIs.

ENVRIPLUS organizes its activities along a main strategic plan where sharing multi-disciplinary expertise will be most effective. It aims to improve Earth observation monitoring systems and strategies, including actions towards harmonization and innovation, to generate common solutions to many shared information technology and data related challenges, to harmonize policies for access and provide strategies for knowledge transfer amongst RIs. ENVRIPLUS develops guidelines to enhance trans-disciplinary use of data and data-products supported by applied use-cases involving RIs from different domains. ENVRIPLUS coordinates actions to improve communication and cooperation, addressing Environmental RIs at all levels, from management to endusers, implementing RI-staff exchange programs, generating material for RI personnel, and proposing common strategic developments and actions for enhancing services to users and evaluating the socio-economic impacts. ENVRIPLUS is expected to facilitate structuration and improve quality of services offered both within single RIs and at pan-RI level. It promotes efficient and multi-disciplinary research offering new opportunities to users, new tools to RI managers and new communication strategies for environmental RI communities. The produced solutions, services and other project results are made available to all environmental RI initiatives, thus contributing to the development of a consistent European RI ecosystem.

Just like the previous project, the ENVRIPLUS project kicked off at the end of 2015 by holding a series of management and technical meetings to plan PLOCAN's contribution to the project from the scientific-technological standpoint. This resulted in the decision to take part in assessing standardised marine sensor network methodologies, with a field test in the Canary Islands.

ESTRAMAR

Marine-Maritime R+D+i Strategy for Macaronesia

Origin of funding: PCT-MAC 2007-2013

Participation: Partner

Total Project funding: 514.362,23 €

Funding for PLOCAN: 166.643,87 €

Percentage of founding: 85 %

The object of the Project is to promote the Marine-Maritime R+D+i of the European and African Macaronesian regions so that their approaches and results are aimed at helping to enhance the articulation of the science-technology-business system in fields such as transport safety and sustainability, maritime tourism and ports, enhancing protection of coastal areas, resources and marine bio-diversity and the forecasting and management of natural risks, and hence drive the socio-economic development of these regions by continuing with international objectives.

This objective is a specific contribution to improve the deficient R+D+i system in a specific area – Marine/Maritime -, where the regions of Macaronesia face their own conditions and have their own potential that, if harnessed, will contribute significant value to their development. Prior experience and the agreements established between partners and other stakeholders of the sector guarantee continuity in strengthening a sound base for co-operation and financial sustainability.

The ESTRAMAR project (PCT-MAC call for projects) made it possible to carry out a range of actions in Macaronesia, with respect to installing new devices and maintaining existing ones, all as part of the Macaronesia Marine Maritime Network (R3M). Maintenance was carried out on an oil-spill early warning buoy in the Azores in September that was moored in Praia da Vitória (island of Terceira). An oceanographic station was also installed in the port of Ponta Delgada (island of São Miguel, Azores). In this case, the installation was performed in co-operation with experts from the Azores Environmental Agency (OAA), the Lisbon Hydrographic Institute (IH) and the Azores Port Authority. An assessment was made on the island of Terceira of the feasibility of installing an oceanographic station in the future in the port of Angra do Heroísmo, associated with the tide gauge that the Portuguese national network has there, managed by the Lisbon Hydrographic Institute (IH).



Illustration 53. Close up of the oceanographic station

In October, a visit was organised to the island of Madeira, also to carry out maintenance and to up-grade an oceanographic station in the port of Caniçal and an oil detection buoy on the island of Porto Santo. The project also enhanced observation capacity by installing a new oceanographic station in the port of Funchal. This new equipment enhanced the observation capacity of the R3M and consolidated co-operation between APRAM (Madeira Port Authority), IH (Portuguese Hydrographic Institute) and PLOCAN in this context in the autonomous region of Madeira.



Illustration 54. Installing an oceanographic station

EURATHLON

Support action form a targeted intelligent autonomous robotic contest: the European RoboAthlon

Origin of funding: FP7-ICT-2011-9/ICT-2011.2.1: Cognitive Systems and Robotics

Participation: Partner

Total project funding: 1.649.996 €

Funding for PLOCAN: 111.066 €

Percentage of funding: 89,17 %

EUROATHLON is a new open-air robotics competition that invites candidate teams to test the intelligence and autonomy of their robots in realistic, simulated emergency-response scenarios. Inspired by the Fukushima accident in 2011, the EUROATHLON competition will require a team of land, marine and air robots to work together to inspect the scene, gather environmental data and identify critical risks. Before this "grand challenge" in 2015, one land-based and one marine-based competition are to be held in 2013 and 2014 respectively. The EUROATHLON competitions will be supported by annual workshops for competitors. At the same time, there will be an open process for developing standards to allow a comparison of different robots in the EUROATHLON competitions. Associated audience-participation activities will connect EUROATHLON to research into robotics, the industry and the emergency services, and also with the general public. The public will be welcome to attend and the EUROATHLON events are expected to draw considerable attention from the press and the media. As it addresses a specific and pressing need – smart robots for disaster response – EUROATHLON will provide European robotics with a platform to challenge the world to spread and show-case an increasingly challenging, wide-spread and high-profile European cognitive robot technology.

The "Grand Challenge was organised in 2015. This is a competition in which multi-domain teams are formed that had to work together to meet the challenge they were given, involving the effective co-operation of three kinds of robots. The competition was certainly a success from the point of view of participation and media impact in Piombino (Italy) in September.

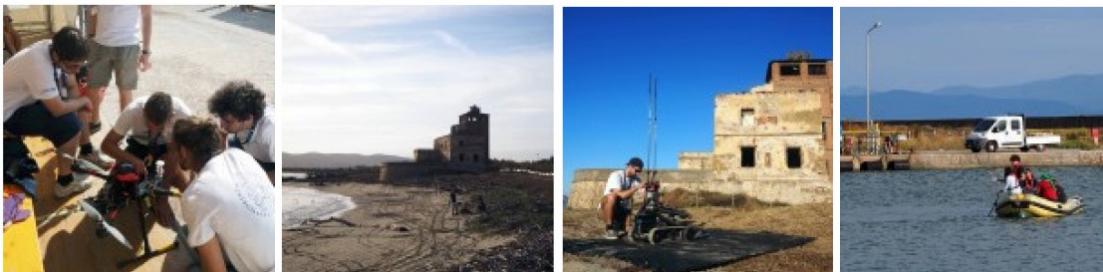


Illustration 55. EuroAthlon 2015

FixO3

Fixed point open ocean observatory network

Origin of funding: FP7-INFRASTRUCTURES-2012-1

Participation: partner

Total project funding: 6.999.999,37 €

Funding for PLOCAN: 613.282,61 €

Percentage of funding: 67,48 %

The fixed point observatory network (FixO 3) seeks to integrate European fixed point open ocean observatories and enhance access for the community in general to these key facilities. This will provide multi-disciplinary observations in all parts of the oceans from the air-sea interface to the deep ocean bed. Co-ordinated by the National Oceanography Centre, United Kingdom, FixO 3 will be based on the significant advances achieved by the EuroSITES, ESONET and CARBOOCEAN FP 7 programmes. With a budget of €8.4m over 4 years (from September 2013), the initiative has 29 partners from the areas of academe, research institutions and SMEs. Moreover, 14 international experts from a wide range of disciplines make up the Advisory Committee.

The programme will be achieved by means of:

1. Co-ordination activities to integrate and harmonise the current technological, procedural and electronic infrastructure processes. Strong ties will be fostered with a broad community from academe, industry, politics and the general public via dissemination, an exchange of know-how and training activities.
2. Support actions to offer a) access to observatory facilities for those who do not currently have such access and b) free access to data and product services.
3. Joint research activities to innovate and improve the current capacity for multi-disciplinary in-situ observation of the ocean. Open ocean observation is currently a priority for European marine and maritime activities, as reflected in the recent declaration made by the EurOCEAN 2010 Conference, and internationally from the declaration of the OceanObs09 Conference. The programme proposals will provide important data on environmental products and services to tackle the Framework Directive on Marine Strategy and to provide support for the E.U. Integral Maritime Policy. The FixO 3 network will

provide free access to top-quality in-situ fixed point data. It will provide an integral framework of open ocean facilities in the Atlantic Ocean from the Arctic to the Antarctic and throughout the Mediterranean, allowing for an integral, regional and multi-disciplinary approach to understand natural and man-made changes in the ocean.

In October, PLOCAN took part in the Technical Review of the first 18 months of the project conducted by the European Commission, where it presented the results of its package (WP9). At the same time, it took part in the annual general assembly of the project, in the meeting of the Governors' Committee and in a workshop on data management. All these activities took place in Brussels between the 12th and the 14th of October 2015.



Illustration 56. Group photo of the FIXO3 annual general assembly

As co-leader of the "Transnational Access-TNA", PLOCAN putout the 2nd TNA call for proposals from the TNA Office (fixo3.tna@plocan.eu) which was open from 1st of May to the 31st of July 2015. A range of proposals were received, for both the PLOCAN and the ESTOC observatories, all of which were assessed.



Illustration 57. Transnational FIXO3 call for proposals

LEANWIND

Logistic efficiencies and naval architecture for wind installations with novel developments

Origin of funding: The Ocean of Tomorrow 2013 / FP7- OCEAN-2013 / OCEAN.2013-4 Innovative transport and deployment systems for the offshore wind energy sector

Participation: Partner

Total project funding: 9.986.231 €

Funding for PLOCAN: 203.930 €

Percentage of funding: 75,88 %

The main objective of LEANWIND is to reduce costs over the whole life cycle and supply chain of offshore wind farms and to develop state-of-the-art tools and technologies. The marine wind energy industry in inshore shallow water sites still has to become economically competitive with conventional energy sources while new sites are planned further off-shore or in deeper waters, giving rise to new challenges. The off-shore wind power industry has still to apply lean principles in the logistics operations of wind farms and in all stages of its life cycle, as the LEANWIND Project proposes. Lean principles were originally developed by Toyota to optimise the processes of the manufacturing industry. These optimisation and efficiency principles have subsequently been adopted by many other industries to eliminate wasteful stages and to make processes more responsive. These principles will be applied to each of the critical stages of the project: logistics processes, land-based transport links, temporary storage and port facilities, vessels, cranes and lifting machinery, safety and operations and maintenance. The LEANWIND approach will ensure the elimination of unnecessarily complex or wasteful stages of the development process, which makes the transition between stages faster, enhances quality and hence optimises time and costs to enable the industry to reduce the gap between current expenditure and the economic aspirations of the industry.

A workshop was held in the PLOCAN facilities on the 21st and 22nd of January 2015 to bring together and integrate the activities of the LEANWIND project. The workshop was attended by 16 people from different entities and companies belonging to the consortium.

The main objective of this workshop was to share the work that had been carried out in the different technical work packages of the project in order to define common scenarios based on the technologies considered in WPs 2, 3 and 4 concerning wind generator sub-structures, the design of new installation / operation and maintenance (O&M) boats and equipment and the O&M strategies of an off-shore wind farm.

In April 2015, as part of the same project, PLOCAN prepared a report that included a matrix of possible scenarios that can be demonstrated and simulated and a test and validation strategy plan that will be implemented in WP7 (Testing and validating tools and technologies) led by PLOCAN, based on the different capacities of each project partner.

In June PLOCAN prepared the internal LEANWIND project report, in collaboration with the ULPGC, on the internal diagnosis and prognosis methodologies of wind turbines.

NETBIOME-CSA

Strengthen European research cooperation for smart and sustainable management of tropical and subtropical biodiversity in ORs and OCTs

Origin of funding: ENVIRONMENT 2013: ONE-STAGE / FP7ENV-2013-one-stage / ENV.2013.6.5-2

Mobilising environmental knowledge for policy and society

Participation: Partner

Total project funding: 999.615 €

Funding for PLOCAN: 88.573 €

Percentage of funding: 89,17 %

NetBiome-CSA will extend and strengthen research and co-operation alliances for the smart and sustainable management of tropical and sub-tropical biodiversity in the Outermost Regions (ORs) and the Overseas Countries and Territories (OCTs). This will be achieved through a participative process, mobilising the stakeholders, their know-how and resources for initiatives such as policy and priority analysis, dialogue among multiple interested parties, exchange of best practices, training and recommendations.

The project is based on the association of existing biodiversity researchers created through the ERA-Net NetBiome Project and takes up the challenge of mobilising more parties interested on all levels of the quadruple helix (knowledge institutions, business, government and civil society) to tackle the top-priority challenges identified to reconcile conservation and the sustainable handling of tropical biodiversity with the sustainable development of European regions and territories, based on the benefits arising from the enormous biodiversity. The project activities, specifically adapted to the needs and priorities identified by the ORs and OCTs, will help with: an improvement in the governance of research and innovation; an alignment of research efforts with political needs, strengthening evidence-based policies; improved implementation and impact of EU biodiversity strategy and the CDB strategy plan; A Biodiversity Management Toolbox, and increase in social, economic and cultural development of the regions; a higher profile for the ORs and the OCTs and an up-take of best practises, experience and know-how; efficient international and trans-national co-operation among European ORs and OCTs and with third countries. NetBiome-CSA addresses the (ENV.2013.6.5-2) issue completely and sub-issue (g) of the work programme as its activities will promote research alliances towards the sustainable management of biodiversity in European ORs and OCTs, giving rise to a continuation and extension of the NetBiome alliance.

PLOCAN took part in the annual project general assembly that was held on the island of La Reunion in June.



Illustration 58. Participants in the annual general assembly

A series of interviews were held in the Canary Islands in 2015 about bio-diversity appraisal. The data were used to prepare a document entitled "Uptake of ecosystem valuation in policymaking in Europe's overseas entities".

PLOCAN also took part in the different stages of creating the "Biodiversity Toolbox" available on internet so that anyone interested in tropical and sub-tropical bio-diversity can access and mine the information.

NEXOS

Next generation, cost-effective, compact, multifunctional web enabled ocean sensor systems empowering marine, maritime and fisheries management

Origin of funding: The Ocean of Tomorrow 2013 / FP7- OCEAN-2013 / OCEAN.2013-2 Innovative multifunctional sensors for in-situ monitoring of marine environment and related maritime activities

Participation: Leader

Total project funding: 5.906.479 €

Funding for PLOCAN: 500.324 €

Percentage of funding: 82,31 %

According to those responsible for marine research in Europe in the Ostend Declaration of 2010, support for the development of a truly integrated and sustainably funded European oceanographic observation system is a major challenge. This can be achieved with the long term measurement of key parameters but it is hindered by the cost and the lack of reliability of oceanographic sensors in general. The NeXOS Project aims to improve the time and space cover, the resolution and the quality of marine observations by developing cheap, innovative and inter-operable in-situ sensors that can be deployed from multiple platforms and web services for key domains and applications. This will be achieved by developing new, low-cost, compact, integrated sensors, with multiple functions, including the measurement of key parameters that are useful for a series of objectives, from more accurate marine monitoring and modelling to better evaluation of fisheries. Seven new, compact, efficient sensors will be developed, based on optic and acoustic technologies, aimed at most of the descriptors identified by the Framework Directive on Marine Strategy aimed at attaining a good ecological state. Two of the new sensors will contribute specifically to the Common Fisheries Policy with the pertinent variables for an eco-systemic approach to fisheries. All the new sensors will meet the need for multi-platform integration, inter-

operability of data and sensors with quality guarantees and the reliability requisites. All of these will be specified for each new sensor system. All the new sensors will be calibrated, integrated in several types of platform, scientifically validated and demonstrated. Finally, one of the main objectives of NeXOS is to improve the competitiveness of European SMEs in the marine sensor market. With this purpose, the specifications and requisites of the sensors will be evaluated in an early stage of the project for market penetration.

2015 was an important year for the Nexos project, coinciding with several significant milestones in its implementation. "A new passive acoustic monitoring system (pams) based on the nexus smart electronic interface" was presented at ASLO 2015 (Aquatic Science Meeting) conference held in Granada in February.

The fourth project executive and co-ordination committee meeting was held in March in the offices of Ecorys in Rotterdam, with the participation of 21 European organisations that comprise the consortium. The meeting discussed progress on the technical work packages and the sensor testing, validation, integration and demonstration plans. A preliminary version of the official document for the European Commission about the information activities to date was also presented.

In May, as project co-ordinator, PLOCAN submitted the first official report to the European Commission, a comprehensive document of the scientific-technical bases of the project, the sensor development plans and requirements, progress made towards the project goals and a summary of the administrative and financial management activities.

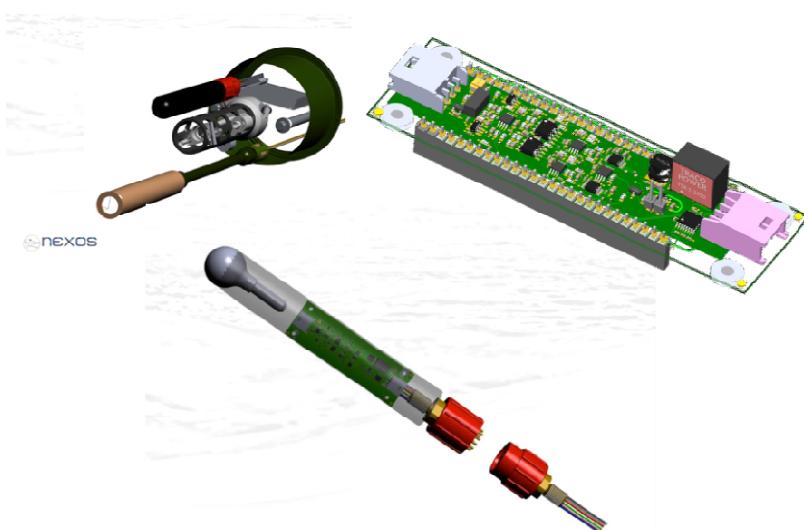


Illustration 59. Hydrophones developed as part of the NEXOS project

June was a period of transition, coinciding with the end of phase two of the project and the beginning of phase three. Phase three is scheduled to see the completion of calibrating the sensors and integrating them in the ocean observation platforms according to the implementation plans defined in phase two and updated in September 2015.

August saw the publication of the article: "Comes of Age: European Consortium Advances Interoperability in Marine Science" in the "Earthzine Web magazine".

Finally, October saw the fifth project co-ordination meeting and the general assembly of the partners in the offices of the UPC (Polytechnic University of Catalonia) in Vilanova i la Geltrú. During the meeting, they analysed progress, with special attention paid to the transversal aspects of the project, the plans to integrate developments into the monitoring platforms and there were also co-operation activities among projects of the Oceans of Tomorrow 2 call for proposals and meetings with international entities.

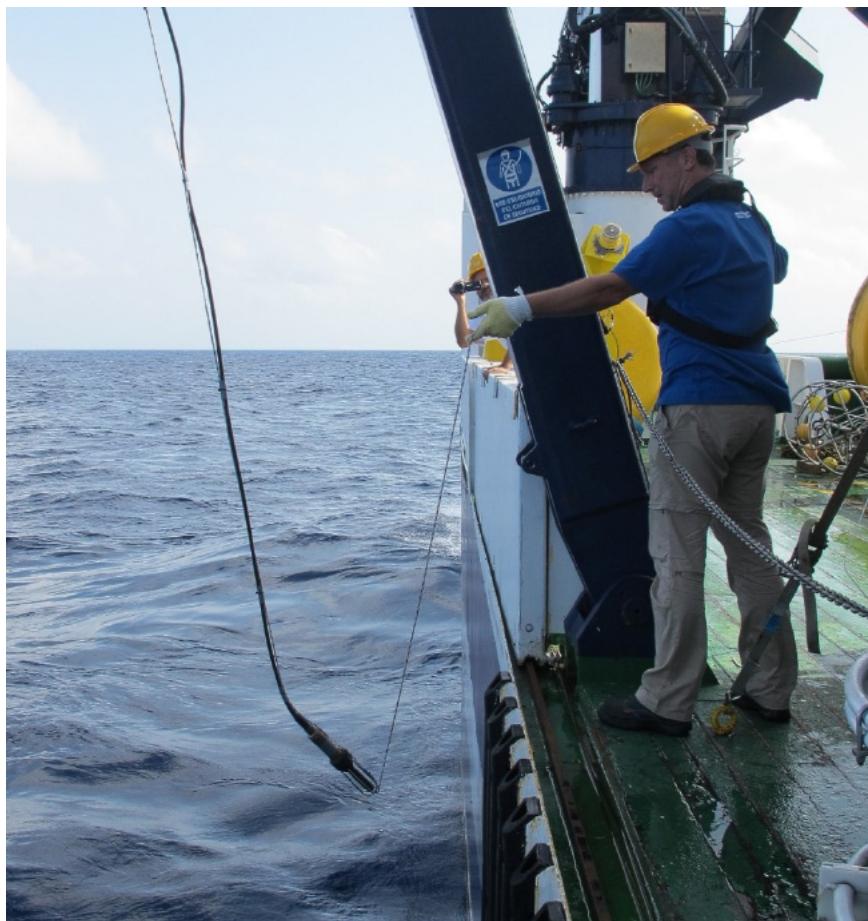


Illustration 6o. Hydrophone validation test during the ESTOC campaign

OCEANERA-NET

Coordination of national research activities of member states and associated states in the field of ocean energy

Origin of funding: ERA-NET Call 2013 / FP7- ERANET-2013-RTD / ENERGY.2013.10.1.3 Supporting the coordination of national research activities of Member States and Associated States in the field of OCEAN energy (ERA-NET)

Participation: Partner

Total project funding: 2.205.037,57 €

Funding for PLOCAN: 125.034,61 €

Percentage of funding: 89,65 %

The vast European coastline houses enormous potential for ocean energy to be exploited as a source of renewable electricity, contributing to the objectives for 2020 and beyond. The ocean is a complex working environment, relatively little is known about it and it is widely used by other sectors, such as fishing, transport and leisure. However, the price of generating ocean energy is high, estimated by DG MARE, for 380 GW.

Several member states and regions are currently funding ocean energy research, demonstration, technology and innovation (R+D+T+i). There is a common objective to generate know-how of the marine environment and to accelerate the development of this emerging sector. But these research efforts are not co-ordinated. For this reason, member states are proposing the ocean energy ERA-NET as described in this document. The ERA-NET will provide a framework for joint, trans-national activities and will co-operate with the EERA Ocean Energy Joint Programme and other important European projects and the industry stakeholders.

This wide-reaching ERA-NET brings together 16 partners from nine states with the intention of obtaining the benefits of a co-ordinated funding of research. The member states have different levels of commitment to the ocean energy sector, and it is important that the ERA-NET actions reflect this fact. The objective is to improve the quality, scope and fragmentation of research with better networks, tackling common barriers and improving co-ordination. The proposal establishes the implementation of the project from the creation of networks and sharing of know-how, to the launch of at least one joint, trans-national call for projects. This way, the partners will develop a shared vision of the sector, an action plan to deliver and a toolbox for administration. The result will be less fragmentation in funding research, the development and greater dissemination of best practices and support for marketing the ocean energy sector.

During Bilbao Energy Week, held in April in Bilbao, PLOCAN took part in the information event concerning the results of the first call for proposals put out as part of this project. During the event, initial planning took place for the second call for proposals. Energy Week also included a general assembly, a meeting with the advisory committee and another with the steering committee.

PLOCAN sent the deliverables that it was responsible for to the European Commission in May, thus completing the project action plan.

PLOCAN presented the results of the package that it leads (WP3) during the technical review conducted by the European Commission in Brussels in October to verify project implementation status.

Also in October, PLOCAN took part in several events relating to the project in Dublin, such as the *Brokerage event*, the workshop for people interested in ideas and priorities for contributing to the draft road map of the Ocean Energy Forum, steering committee meetings and finally the meeting to prepare the second call for proposals.



Illustration 61. Brokerage event

PCMA

PLOCAN test bed electricity generation device observation and environmental control programme

Origin of funding: Technology fund programme ERDF

Participation: Leader

Total project funding: 640.000 €

Funding for PLOCAN: 640.000 €

Percentage of funding: 80 %

The central objective of the project is to develop an observation and environmental control programme for the concentration of electricity generation devices on the PLOCAN test bed. This objective fits the raft of regular activities aimed at the environmental observation and assessment of the marine environment, including aspects of design, realisation, data generation, evaluation and production of useful information for the management and administration of marine renewable energies. This information is placed at the service of companies and public administrations interested in the field of marine renewable energies.

The objective considered in this project is to monitor all the activities that are taking place, or which are going to take place in the Electricity and Communications Infrastructure of the PLOCAN Test Bed and the Submarine Transformer Sub-Statin permanently and in real time. To this end, an operational and environmental surveillance plan is established that will provide greater insight into the interaction between the components that make up an electricity production network at sea and its effects on the surrounding marine environment.

In this sense, the observation programme will enable us to study different operating and management methodologies for the structural components of the network (cables, wave energy converters, observation instruments, etc.). In particular, methodologies can be studied for working with divers and ROVs. On the other hand, it will allow key environmental parameters to be monitored, such as the electro-magnetic fields generated, facilitating the trials of different sensors and sampling methodologies that will subsequently help to assess the effects on the marine environment better.

The activities carried out in 2015 regarding the environmental characterisation of the test bed area are as follows:

- Environmental impact study of the infrastructure as a whole that will generate and evacuate electricity from off-shore energies on the test bed. These facilities include the off-shore wind turbines, the wave converters, submarine transformer station and underwater electric wiring.
- Measuring underwater noise in the test bed area by installing hydrophones. This study is aimed at discovering background underwater noise in the area. This way, an assessment can be made in the future of the excess noise brought into the marine environment by the technologies installed and thus assess the possible environmental impact stemming from such activities.



Illustration 62. Installing devices to measure noise underwater

- Geo-physical study of the sea beds aimed at discovering the thickness of the unconsolidated sediment layer and the morphology of the seabed. This study is vital for planning mooring sites for the different technologies that are tested on the test bed.

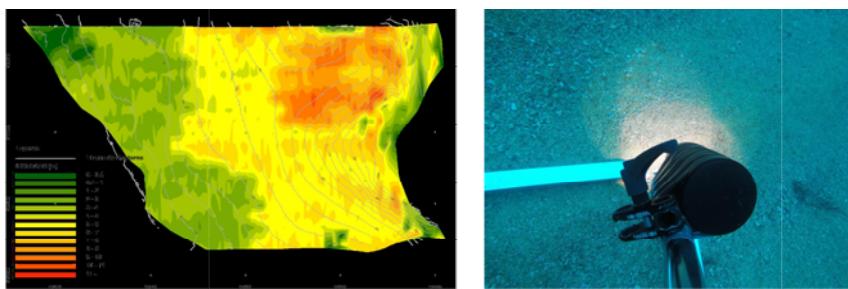


Illustration 63. Geo-physical study of the seabed on the test bed

- Oceanographic campaign to measure marine physical and chemical parameters. This activity started in 2011 and has continued ever since. It consists of measuring indicator parameters that provide information about the characteristics of the water mass inside the test bed area. To this end, samples are taken every so often at 11 stations to measure the following parameters:

temperature, salinity, pH, dissolved oxygen, chlorophyll, nutrients, heavy metals and hydrocarbons.

- Measuring marine currents by installing a current metre. This activity allows PLOCAN to discover the intensity and direction of marine currents within the test bed area.

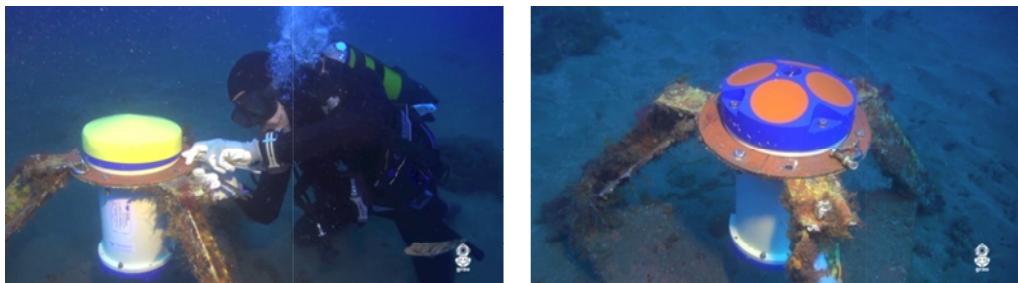


Illustration 64. Installing an acoustic current Doppler profiler (ACDP)

- Study of the levels of the electric and magnetic field in the marine area of the test bed. This study was aimed at measuring the natural levels of the electric and magnetic field in the test area in order to be able to compare these in future with the values induced by the submarine electricity infrastructure.

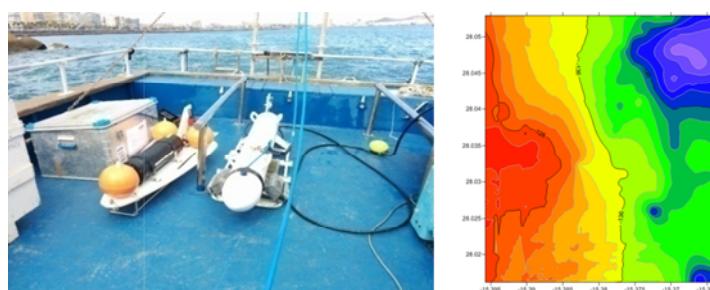


Illustration 65. Studying the levels of the electric and magnetic field

- Study of the presence of cetaceans and marine turtles, performed by boat by experts in whale and turtle watching and identification. The operational part of this study promoted by PLOCAN was performed by SECAC (Society for studying cetaceans in the Canary Island Archipelago) which was given full access to the vessel PLOCAN UNO with a specialist crew for the job. Sampling was carried out visually, following pre-defined transects laid down over the test bed area and its boundaries. Each species found was identified from photographs and recorded. Acoustic measurements were also taken with a hydrophone at different points to determine whether there was activity of these marine mammals that had not been identified from the surface.



Illustration 66. Whale and turtle watching on the test bed



Illustration 67. Sampling tracks

PERSEUS

Protection of European seas and borders through the intelligent use of surveillance

Origin of funding: Security Research Call 3 / FP7- SEC-2010-1 / SEC-2010.3.1-1 Europeanwide integrated maritime border control system - phase II

Participation: Partner

Total project funding: 27.847.579 €

Percentage of funding: 374.056,67 €

PERSEUS contributes to Europe's efforts to control illegal immigration and fight the associated crime and smuggling by proposing a large-scale demonstration of an EU-wide marine surveillance system, based on existing national surveillance systems, improving them with innovative capacities and going beyond the expectations of EUROSUR 2013, by tackling the key challenges: - support for the network created by the national contact centres, Frontex and EMSA by means of greater capacities, including the trans-national exchange of useful and available information and of the associated mechanisms and procedures, thus supporting the creation of a common environment of exchange of information.

- generation of a common situation dashboard
- improved detection and identification of non-collaborative/suspicious small boats and low-flying aircraft
- improved and increasingly automated detection of abnormal behaviour of boats, threat identification and monitoring and reports on non-identified boats. PERSEUS organises this demonstration in 5 exercises grouped together in 2 campaigns, carrying out drug-smuggling and illegal immigration missions and providing continual surveillance from the coast to the high seas. PERSEUS offers a broad set of validated and proven recommendations and proposes standards. PERSEUS has brought together the main users and suppliers, ensuring privileged access to existing surveillance systems and resources for optimum cover of the area in question. These users will define, assess and validate the alignment of the PERSEUS recommendations with their own needs. PERSEUS also includes a mechanism to extend the user base and integrate emerging technologies during its life time. PERSEUS will enhance the efficiency and operational capacity of existing systems and it will make an important and co-ordinated contribution to establishing an integral system of Europe-wide maritime border control.

In April, a technical team comprised of staff from the Centre for Marine Research Experimentation (CMRE) and PLOCAN conducted trials in the waters of La Spezia (Italy) –CMRE operations base- with a Waveglider autonomous marine observation vehicle, set up specifically on this occasion to house a latest-generation passive submarine hydrophone as part of its environmental sensor package, in order to find answers to certain challenges posed by the European PERSEUS-FP7 project, including detecting and characterising submarine acoustic traces in certain marine area of Europe.



Illustration 68. Waveglider being transported to the trial site

PERSEUS-FP7 is a project led by Spanish company INDRA, in which CMRE and PLOCAN appear as members of a broad, multi-disciplinary consortium made up of some thirty-something European companies and institutions.

At the same time of year, and also as part of this same project, the German institute for marine environmental scientific research, MARUM, and PLOCAN conducted joint tests with a new autonomous marine observation vehicle, with the main objective of assessing its main operational capacities in a real scenario such as the waters around the PLOCAN test bed area in Gran Canaria.



Illustration 69. Testing the Waveglider in the water

This is a Waveglider SV3. Its operating principle is based on harnessing energy from the waves as a source of propulsion. It houses a range of meteo-oceanographic sensors and satellite communication systems to

pilot it remotely. It is piloted by a multi-disciplinary technical team from the operations and control room that PLOCAN has at its on-shore offices at Taliarte.

A demonstration exercise of the PERSEUS project was performed on the PLOCAN test bed in May. The experimental device on trial, an autonomous surface glider driven by the movement of the waves, includes a passive acoustic module (hydrophone) aimed at recording acoustic traces (sound) beneath the surface of the sea.



Illustration 70. PERSEUS demonstration exercise on the PLOCAN test bed

This exercise was carried out in collaboration with the German institution MARUM (Marine Environmental Science Centre) and experts from both CMRE and PLOCAN. Several vessel detection tests were run during the exercises to assess the capacities and performance of the surveillance system. The demonstration exercises were tracked in real time from the operations control room at PLOCAN's on-shore offices.

This event was the first awareness-raising session of the PLOCAN Marine Maritime ITC Demonstration Centre, rolled out by the Ministry of Industry, Energy and Tourism through the Publicly Owned Company Red.es and co-financed by the European Regional Development Fund (ERDF) and galvanised by Anova IT Consulting.

SWARMS

Smart and Networking UnderWAtter Robots in Cooperation Meshes

Origin of funding: ECSEL-2014-1 / ECSEL-01-2014: ECSEL Key Applications and Essential Technologies (RIA) and Spanish programme for R&D promotion focussed on societal challenges / and International joint programming actions 2014. Although included in the same card, Swarms national and Swarms international are considered independent projects attending to fund origin.

Participation: Partner

Total project funding: 6.406.818,64 € + 5.675.266,54 €

Funding for PLOCAN: 231.156,25 € + 232.080,00 €

Percentage of funding: 65,13 %

Nowadays, the major part of offshore operations is done by divers in dangerous missions. Since their

number is limited, the dependency on their work represents a real threat to the offshore industry. The extended use of unmanned underwater vehicles (AUVs/ROVs) could solve this problem but since they are usually tailor-made for a specific task and difficult to operate their deployment is very expensive. The overall goal of the SWARMS project is to expand the use of AUVs/ROVs and facilitate the creation, planning and execution of maritime and offshore operations. This will reduce the operational cost and increase the safety of tasks assigned to divers.

The SWARMS project aims to make AUVs/ROVs accessible to more users by:

- Enabling AUVs/ROVs to work in a cooperative mesh thus opening up new applications and ensuring re-usability as no specialized vehicles are needed but heterogeneous standard vehicles can combine their capabilities,
- Increasing the autonomy of AUVs and improving the usability of ROVs. The approach is to design and develop an integrated platform (a set of Software/Hardware components), incorporated into the current generation of underwater vehicles in order to improve autonomy, cooperation, robustness, cost-effectiveness, and reliability of the offshore operations.

SWARMS' achievements will be demonstrated in two field tests in different scenarios:

- Inspection, maintenance and repair of offshore infrastructure
- Pollution monitoring
- Offshore construction operations

SWARMS is an industry-led project: big technology companies will collaborate with SMEs specialized in the subsea, robotics and communication sectors and universities and research institutions to ensure that the newest innovations in subsea robotics will arrive fast to market. As voice of the customer, two end-users are also part of the consortium.

The project kick-off meeting was held in July. The following tasks were performed over the rest of the year:

- Define the case studies that are programmed for each of the three locations contemplated by the project (D8.1)
- Contribute to defining a matrix of submarine and surface vehicles available to the project for tackling the different case studies programmed
- Perform the D8.2 with respect to assessing requisites and a detailed description of PLOCAN's operational scenario (test bed)
- With regard to dissemination and information matters, PLOCAN has prepared an information sheet and has helped to launch the project web site

TROPOS

Modular multi-use deep water offshore platform harnessing and servicing Mediterranean subtropical and tropical marine and maritime resources

Origin of funding: FP7-SECURITY RESEARCH-2010

Participation: Leader

Total project funding: 4.877.911 €
Funding for PLOCAN: 639.380,00 €
Percentage of funding: 88,91 %

The essential objective of the TROPOS Project is to develop a modular, multi-use floating system for use in deep water, with an initial geographic focus on the tropical and sub-tropical Mediterranean regions, but designed to be flexible enough so that it is not limited in its geographic scope.

The TROPOS approach focuses on modular development, where different kinds of module can be combined in accordance with the area. This way, the TROPOS multi-use platform system can integrate a wide range of functions from the sectors of transport, energy, aquaculture and leisure, in a larger number of geographic areas than if were a fixed platform design. Consequently, it provides greater opportunities of profitability.

The TROPOS design will focus on a multi-use floating structure capable of operating and exploiting deep waters, where fixed structures like those driven into the ocean bed are not feasible. The multi-use platforms designed from the concept designs will have the potential to provide European coastal regions with adequate aquaculture systems, innovative transport services and leisure and marine energy solutions.

The main scientific and technological objectives of the project are:

- To determine the optimum sites for off-shore, multi-use platforms in Mediterranean, sub-tropical and tropical latitudes, based on numeric and physical models.
- To research the relations between oceanic activities, including wind energy, aquaculture, maritime transport solutions and other additional services
- To develop new designs for economically-efficient, multi-use modular platforms that allow an optimum coupling of different services and activities
- To study the logistics needs of the new multi-use platform
- To assess the viability and economic feasibility of the platform
- To develop an integral environmental impact methodology and its evaluation
- To set out at least three complete solutions for the Mediterranean, sub-tropical and tropical areas.

The final project meeting took place in the PLOCAN offices in January. The first day was devoted to an internal review of the project and on the second day, there was a stakeholders' meeting attended by over 70 European and international researchers, representatives of the industrial sector interested in developing multi-use off-shore platforms and legislators.



Illustration 71. Group photograph of the participants in the final TROPOS meeting

In December, the Journal of Ocean Technology published an article about the TROPOSproject, entitled "Multi-Use Offshore Platforms for the Future Society: First Designs in the Scope of the FP7 TROPOS Project" and it chose the info-graph of the multi-use off-shore platform for its front cover.

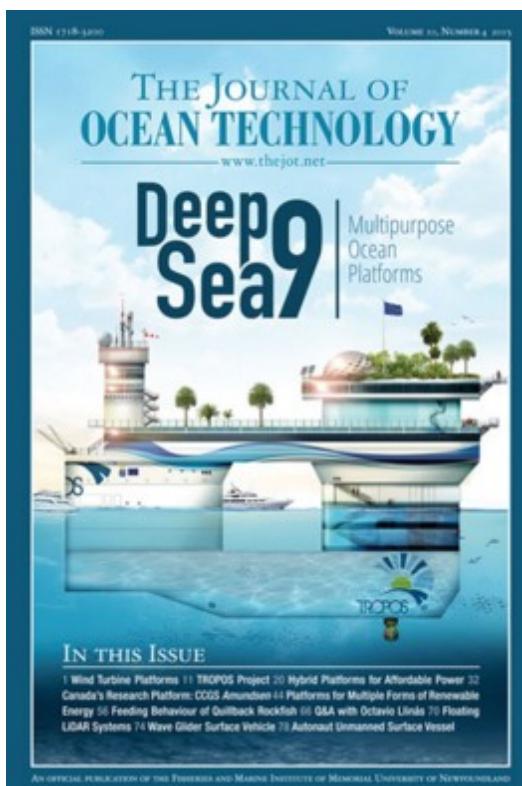


Illustration 72. Front cover of the Journal of Ocean Technology

UNDERWORLD

UNDERWater radiocommunications for Optimized monitoring using multiRelay Devices

Origin of funding: Proyectos I+D+i Retos 2013

Participation: Partner

Total project funding: 314.524 €

Funding for PLOCAN: 113.619 €

Percentage of funding: 100 %

The two research groups from the University of Las Palmas de Gran Canaria and from the Polytechnic University of Madrid have been working on HF communications over for the last sixteen years. Most of their achievements have been obtained thanks to funding obtained from previously awarded domestic projects (TEC2004-06915-Co3, TEC2007-67520-Co2 and TEC2010-21217-Co2) and several private projects funded by AEMIA and the Ministry of Defence. When PLOCAN joined, a sound consortium was created able to face the scientific, technical and technological challenges of this proposal: the re-assessment of electro-magnetic communications (EM) in networks of submarine sensors. To date, most wireless underwater communications have been implemented with acoustic systems, generally considering that underwater communications by radio cannot meet the requirements set.

In fact, the limited range of water due to attenuation is the main obstacle to the environment we face.

The reasons that arouse interest in the project are as follows:

The growing interest of the civil and military industry, environmental and port management entities, among others, in achieving reliable underwater links with higher data rates than acoustic communications. Have a specific key application as an objective: environmental monitoring: in general, it is considered that this is not a better alternative to acoustic communications at great depth between remote sites, with limitations on power or on high data rates. But our scenario focuses on shallow areas both in sea water on the coast and in fresh water in rivers, dams and reservoirs. In this situation, EM systems are the best option as acoustic systems lose performance.

Finally, the paradigm change that has come about thanks to aspects such as DSPs, new, more efficient antenna or new considerations concerning alternative propagation mechanisms.

This project will help: 1) to design new antennae, 2) propagation models, 3) to design low power communications systems and mainly, 4) in a new paradigm in which submarine communications are based on a set of static nodes and also on unmanned vehicles (UUV) that resolve the existing attenuation with multi-jump communication protocols. This new network will be able to both improve existing detection and estimation procedures with data fusion and distributed consensus/ dissemination algorithms, apart from including functions such as self-location, tracking vehicles or providing help to shipping.

All this can be achieved thanks to the combination of theoretical contributions, measuring campaigns, modelling and the development of software and hardware. In fact, the best asset of this project is the balance between these aspects with a view to creating an operational wireless network of submarine sensors that will also be attractive for transferring technology to the interested entities. The major challenge is only feasible thanks to merging the experience and the skills acquired by each of the institutions involved.

PLOCAN's objectives in the project focus on the following aspects:

- Defining measurement scenarios and campaigns
- Applications: distributed monitoring, assisted navigation. Testing real developments
- Information sharing
- Transferring and leveraging results

Several measurement campaigns have been conducted in 2015 in the PLOCAN test tank and at the Taliarte dock in order to verify the behaviour of the submarine channel.



Illustration 73. Measuring tests in the PLOCAN tank



Illustration 74. Testing at Taliarte dock

An information event was held in June for the project at the PLOCAN offices. The main collaborating entities and other entities interested in the project took part. The main objective of the session was to assess submarine radio communications under controlled conditions in the Port of Taliarte, using antennae designed specifically in the UNDERWORLD project. This event is linked to CDTICMar.



Illustration 75. UNDERWORLD project informative event

UNDIGEN+

UNDIGEN Marine Autonomous System

Origin of funding: Retos-Colaboración 2014

Participation: Partner

Total project funding: 266.454,81 €

Funding for PLOCAN: 43.168 €

Percentage of funding: 100 %

The consortium for the Undigen Project (MINECOIPT- 2011-1770-920000), led by the tech company Wedge Global, S.L. has developed a wave energy converter that is in the final stages of sea trials with an innovative electricity generation system, which, in turn, is potentially ideal for different kinds of Wave Energy Converters – WECs –(including Vertical and pendulum point absorbers and Oscillating Water Column).

Notwithstanding the potential of this innovative electricity generation system from a purely energy point of view, it also opens up the possibility of applying this technology autonomously; in other words, as a platform for installing equipment to measure the marine environment with a view to addressing a potential industrial-commercial development as imminently as possible.

It is worth mentioning that the Wedge approach to wave power, focusing from the beginning and giving priority to PTO as they consider it the key component of the global conversion system (WEC), once this key component can modify the properties of the collector, configured, in turn, as a direct conversion system that eliminates intermediate stages and, therefore, provides greater reliability and associated shelf life, together with a significant reduction in operating costs and maintenance of WECs.

Consequently, the central objective of the project focuses on rolling out this action with a view to being able to use the renewable energy generated to autonomously feed the equipment installed in the collector. This can be equipment of different kinds, coastal surveillance equipment, marine research equipment, etc., along with the characterisation of the marine environment for different purposes from a global perspective.

The second Undigen wave-power device was moored in the waters of the Canary Island Oceanic Platform Test Bed in 2015. Sea trials were run on the device from mid-April until the end of June, when it went into a configuration and maintenance phase for future trials. This second year of the project has seen progress

made towards achieving one of the project objectives, to be able to use the renewable energy generated as an autonomous power source for equipment installed on the collector.

The generator was moored one nautical mile off the north-east coast of Gran Canaria, marking the start of testing on a wave energy convertor that includes an innovative 200 kW linear generation system, the W200. This trial is the last step prior to launching a wave-energy generating pilot plant with 100% Spanish technology, the precursor to potential commercial electricity supply to islands and/or coastal areas with difficult access and high generating costs.



Illustration 76. UNDIGEN device moored on the PLOCAN test bed

7. CO-OPERATION AGREEMENTS

Co-operation agreements were signed in 2015 with the following entities:

- Ministry of Defence/Air Force and the Consortium to design, construct, fit out and run the Canary Island Oceanic Platform, for studying the marine currents in the Canary Islands area and the Air Force's Search and Rescue Service
- Gran Canaria Cabildo (Island Government) and the PLOCAN Consortium to foster marine-maritime know-how and economic activity
- Las Palmas de Gran Canaria City Council, EMALSA and the PLOCAN Consortium to develop the PLOCAN test bed electrical and communications infrastructure

- ULPGC for carrying out the activities described in Appendix I of the ATLANTOS project Grant Agreement
- CETECIMA, ULPGC, DESOUSS MASSA REGIONAL COUNCIL, CLUSTER AGADIR HALIOPOLE, LAS PALMAS PORTS FOUNDATION for co-operation and for promoting the port environment regional observatory as part of the SMARTPORT project
- Portuguese Hydrographic Institute for regulating the framework of co-operation between the two institutions with a view to working together in activities of mutual interest
- ESTEYCO to foster, define and take the first steps in co-operation between the parties for everybody's mutual interest, in the hope of facilitating the implementation of ELISA and ELICAN European research projects
- Canary Island University Foundation of Las Palmas to develop the FORMACIÓN DUAL INSERTA capacity-building programme for university and vocational training graduates

The agreements signed include the one signed with the Las Palmas de Gran Canaria city council and EMALSA to develop the PLOCAN test bed electrical and communications infrastructure project. This agreement gives PLOCAN a connection point to the electricity grid to feed in the power produced by the devices being tested on the test bed in the future.



Illustration 77. Signing the agreement with EMALSA and the Las Palmas de GC city council

The agreement with the Ministry of Defence (Air Force) gives PLOCAN a co-operation framework that allows it to work jointly with the Air Force in case of emergencies at sea.

The agreement signed with the Portuguese Hydrographic Institute, represented by Rear Admiral José Luis Branco Seabra de Melo provides continuity for the fruitful co-operation seen between the two institutions to date in the area of oceanic observation marine technologies in the region of Macaronesia.



Illustration 78. Signing the agreement with the Portuguese Hydrographic Institute

The nature of the agreements signed by PLOCAN since it was created up to the end of 2015 can be seen graphically as follows:

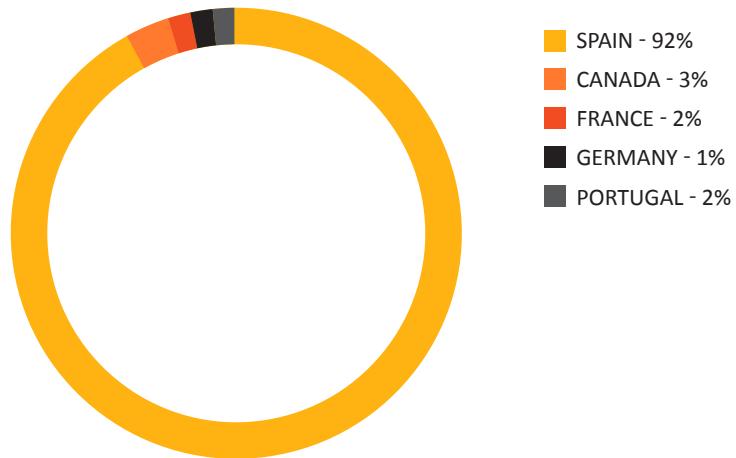


Illustration 79. Agreements signed by countries

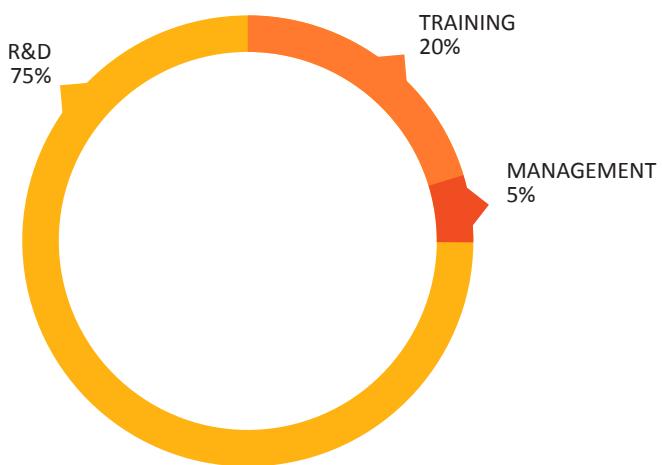


Illustration 80. Classification of agreements signed in accordance with the nature of them

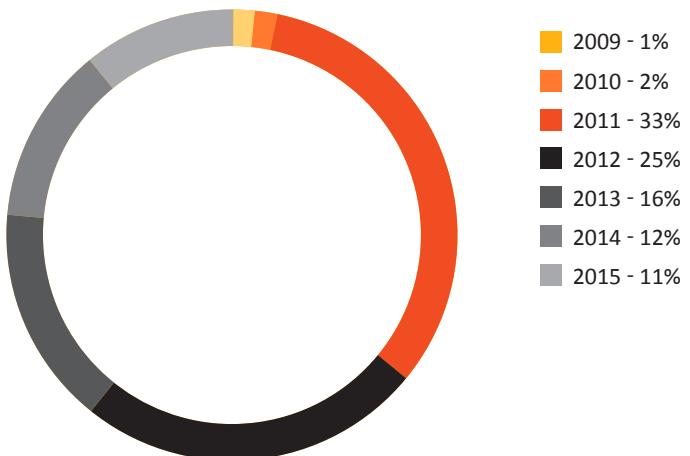


Illustration 81. Agreements signed by years

8. TRAINING, FOSTERING SCIENTIFIC VOCATIONS AND DISSEMINATION

PLOCAN provides internship opportunities for university students in different areas related to its activities, including Engineering (electronic, tele-communications, IT), Marine Sciences, Translating and Interpreting and Law.

A total of five students have signed up to this training programme in 2015 (not counting those that have taken part in specific schools) to do an internship for their degree and their final year dissertation. Three students did internships in the area of vocational training.

In 2015, the technical and administrative staff of PLOCAN received training and advanced training in new high-tech equipment with a view to building their capacities in order to make them available to the scientific-technical community and to provide access to future users. On the other hand, due to the growing participation in European projects, the area of training selected was theoretical-practical education concerning the H2020 call for proposals and project management in general. Finally, technical capacity-building courses were given in information technologies.

The dissemination and information activities aimed at fostering scientific and technological vocations rolled out in 2015 were as follows:

Educational Passages

In May, students from the Liceo Francés of Gran Canaria, supervised by PLOCAN staff, prepared a boat that was launched and commissioned from the French frigate Hermione to start out on its voyage to America.



Illustration 82. Educational Passages "Canaries" with students and the frigate Hermione in the background

Educational Passages is an international educational programme, created and led by a multi-disciplinary consortium of American institutions, including NOAA and several high schools. The programme receives co-operation from other countries, including Portugal, France, Canada, Norway, the United Kingdom and Spain.

The idea of this initiative is that secondary education students take part in building small sailing dinghies in their technology class for one school year. The dinghies measure approximately 1.5 metres long and weigh about 20 kilos and they are made from the same mould. They assemble the boat and seal its main parts and they fit it with a GPS transmitter, before they are released in the ocean (mainly the North Atlantic) and they track them during their passage. The basic building materials form part of a single kit that is supplied to each school. This initiative gives students an entrance into the world of technology, as well as

other core subjects such as biology, oceanography, history and IT, languages, as they can interact with schools taking part from other countries, by means of ITCs for the main objective of exchanging know-how and experiences.

PLOCAN plays the role of catalyst in the Canary Islands for this initiative. Although two dinghies were launched from the south of Gran Canaria last year, built by US schools, in a launch that acted as a pilot experience, and which also included the participation of three schools from Gran Canaria, the original boats are now built on the island, so the entire process of assembling and finishing them can now be done in local Canary Island schools.

ROV workshop



Illustration 83. Submarine robotics workshop demonstration event

The demonstration event at the third edition of EDUROVs was held on the 26th of May in the Julio Navarro swimming pool in Las Palmas de Gran Canaria. 150 students from 24 secondary education centres in the Canary Islands, from the Learning by Doing Centre and the Nuestra Señora de la Merced from San Juan de Puerto Rico in the United States all took part. This year, the students presented far more advanced prototypes than in the previous two years and they showed their skills in handling the prototypes that they had built.

EDUROVs is a project organised by PLOCAN in collaboration with the Social Work Programme of "la Caixa" bank. The main aim of the event is to stimulate vocations among young people in technical and scientific disciplines by building prototype submarine robots at school.

This third edition of the event saw the participation of students from Garoé High School, Valverde, Island of El Hierro, Güímar High School, Santa Ana High School, Candelaria, Tenerife, Cruz Santa High School, Los Realejos, Tenerife; Vigan de Tuineje High School, Gran Tarajal High School, Puerto del Rosario High School, CPEIPS Santo Domingo Savio, CPES Santa Catalina, Schamann High School, Neuva Isleta Tony Gallardo High School, Francisco Hernández Monzón High School and the El Rincón High School, from Las Palmas de Gran Canaria; The José Arencibia Gil High School and the IES José Frugoni Pérez High School, from Telde; the Vega de San Mateo High School; the Cruce de Arinaga High School and the Playa de Arinaga High School, in Agüimes, the Roque Amagro High School, Gáldar, and the Santa Brígida High School, all from Gran Canaria; and the Haría High School, the Tinajo High School and the Las Salinas, from Arrecife, on the island of Lanzarote.

This third event also had an international dimension with the participation of secondary education students from the Learning by Doing school, Nuestra Señora de la Merced School from San Juan de Puerto Rico (United States).

This project gives young people an idea about submarine robotics in a practical way, aiming to arouse motivation, vocation and an interest in science and technology and knowledge of the ocean.

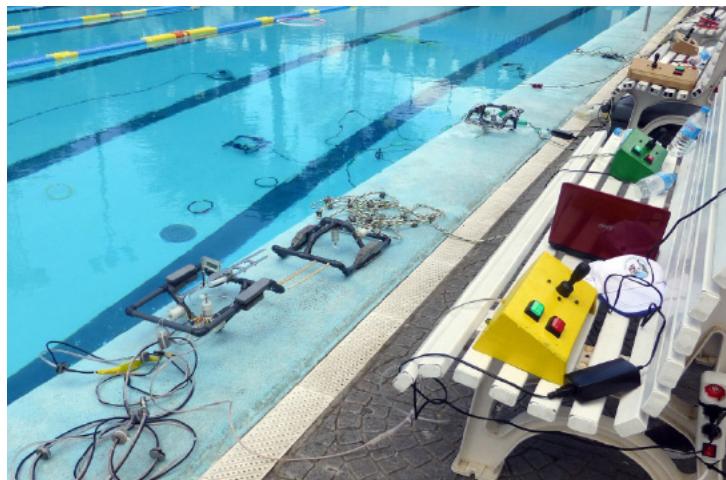


Illustration 84. Prototypes presented by the students

The project introduces the students to science, technology and engineering, reinforcing concepts like Newton's laws, density, moment, torque, force and distribution of masses. It also fosters and incentivises team work, respecting values and promoting creativity, bearing in mind a technological need that can be used at sea, respect for the environment; all using everyday materials.

The event was attended by the Deputy Delegate of the Government in Las Palmas, Luis Molina, the deputy minister of the president's office of the Canary Island government, Jorge Marín Rodríguez, the director general of the Canary Island Research, Innovation and Information Society Agency, Juan Ruiz Alzola, the Head of the Environmental Department of the Sub-Directorate General for Scientific and Technological Infrastructure Planning from MINECO, Ana Aricha Yanguas, and the Councillor responsible for the Sea City from Las Palmas de Gran Canaria City Council, Adelina González Muñoz, the vice chancellor for Research, Development and Innovation from the University of Las Palmas de Gran Canaria, Antonio López Falcón, and the director of the Area of Business from CaixaBank in the south of Gran Canaria, Isabel Casal López.

Glider School 2015



Illustration 85. Theoretical class at Glider School 2015

The twenty sixth edition of glider school was held in October in the PLOCAN facilities. Students and teachers from about twenty international tech-based companies and twelve oceanographic research institutions from eleven countries (Brazil, Canada, USA, United Kingdom, Cyprus, Norway, Greece, France, Finland, Germany and Spain) took part. There were both theoretical classes and practical sessions in the laboratory and in open waters during the six days of the course.



Illustration 86. Practical session at glider school

This international school has consolidated its reputation as a benchmark training and networking event for an emerging technology sector – submarine robotics, in particular autonomous, unmanned observation vehicles. The technological development associated with ocean observation using cutting edge technology and its direct applications in the main social and economic fields of the marine maritime sector form part of PLOCAN's strategic objectives as a glider port benchmark infrastructure for the Eastern Central North Atlantic.

PLOCAN attended the following trade fairs:

FIMAR 2015



Illustration 87. PLOCAN stand at FIMAR 2015

PLOCAN attended the fifth International Sea Fair (FIMAR) organised by the City Council of Las Palmas de Gran Canaria through its Department of Sea City in April in Plaza de Canarias, Las Palmas de Gran Canaria. The fair attracted over 20,000 visitors and over one hundred exhibition marquees from public and private institutions, companies and research groups working on developing the Blue Economy in the Canary Islands.

PLOCAN exhibited its main activities in technological development and specialist training through collaborative actions and projects with entities and companies working in what are clearly emerging sectors of great strategic importance for the Canary Islands such as submarine robotics, renewable off-shore energies and marine observation itself, using cutting edge technology, and also provided details of the construction status of its off-shore offices.

Science Week

PLOCAN took part in the fourth edition of the Canary Island Science and Innovation Week Mini Trade Fairs on the 12th, 13th and 14th of November in Las Palmas de Gran Canaria, with the exhibition "The Macaronesia Ocean" and offering a lecture on the Submarine Robotics Workshop for secondary students 2015-2016.

Fuerteventura Science and Technology Fair

On the same dates, PLOCAN also took part in the I Gambuesa Scientifica Science and Technology Fair held in the Fuerteventura Technology Park. On this occasion, PLOCAN presented the EDUROVs project (Submarine Robotics Workshop for secondary students), where they offered a demonstration with the robots that had been built last year by the students of the schools of the island of Fuerteventura.



Illustration 88. View of the PLOCAN stand at the I Gambuesa Científica

In October, PLOCAN reached an agreement with the Canary Island Institute of Technology to take part in the DEMOLA Canaries programme. The aim of the programme is for Canary Island entities to put challenges to a multi-disciplinary group of university students in a co-creation project (students-business) that must provide real solutions to these challenges. The model involves universities and companies to give students an insight into the world of business and to apply their talents in business, hence improving the innovative eco-system of the region and the competitiveness of the business fabric.

In the case of PLOCAN, the challenge posed was "New uses for the Oceanic Platform" and the expected result was for the creative spirit of the students involved to be able to identify and bring out other innovative uses for the platform that may not be obvious at first sight, but which could be of interest to public and private entities and institutions. These uses also had to be accompanied by an estimate of their feasibility and their compatibility with the platform's ordinary activities and an estimate of the number of potential users. The students have until the end of February 2016 to provide solutions to the challenge.

Publications and Informative Material:

Information material is produced constantly throughout the year for distribution in dissemination and information activities. PLOCAN has a collection of information sheets, brochures and posters that are updated and modified in line with the public they are aimed at.

Promoting PLOCAN in different forums:

In March, PLOCAN took part in the VII professional orientation conference held in the Faculty of Translation and Interpreting of the ULPGC with an oral presentation. The objective was to promote the possibilities offered by marine science and technology in the field of translating and interpreting among the students.

The Ocean Business international trade fair was held in April in the facilities of the National Oceanography Centre (NOC) in the city of Southampton, United Kingdom. The event attracted over three hundred leading companies and benchmark institutions linked to the technological development and marketing of

instruments and systems for oceanic observation, in order to showcase the latest advances in the sector in a broad and varied programme of lectures and technical demonstration sessions and a permanent exhibition area.



Illustration 8g. Ocean Business Exhibition

As in previous years, PLOCAN was present at the event to gain first-hand insight into the latest technological developments in everything to do with marine observation systems, identify new synergies and co-operation opportunities with companies and institutions in the context of international projects, the use of PLOCAN infrastructures in Gran Canaria for testing new prototypes and to publicise the International Glider School that PLOCAN organises each year.

The VI Naval Conference was held in May in a range of different venues in the city of Las Palmas de Gran Canaria, organised by the Royal Economic Society Friends of the Country of Gran Canaria (RSEAPGC) and the Navy's Naval History and Culture Body to celebrate the one hundredth anniversary of the submarine in Spain and the figure of Isaac Peral.



Illustration 9o. Glider demonstration performed by PLOCAN

Apart from acting as a collaborating entity, PLOCAN also took part in this naval conference with a model glider in the Elder Museum and a lecture on this technology accompanied by a demonstration in the facilities of Las Palmas Military Arsenal.

In May, PLOCAN took part in the Glider Community International Workshop 2015 at East Anglia University (Norwich, UK). The main objective of this event was to bring together the community of users to facilitate the presentation and discussion of these scientific studies that are being conducted by different groups based on data provided by this kind of unmanned submarine vehicles.



Illustration 91. Participants in the workshop

There were around 30 short oral presentations made at the workshop by the different participants, fostering a debate on the contents presented and a continuous poster session. These sessions showed the enormous potential of this kind of observation platform, presenting the results of studies carried out as far apart as the Indian Ocean, the North Atlantic, the Mediterranean and the Antarctic. The Finnish Meteorological Institute (FMI) presented the preliminary results of the first glider study in the Baltic Sea, an operation that was carried out by PLOCAN with the collaboration of the FMI.

PLOCAN also made a presentation about the main activities it conducts with gliders at the event, such as testing new technological developments in collaboration with international institutions and companies, seasonal missions at the Canary Island European Oceanic Time Series Station (ESTOC) and the International Glider School.

PLOCAN also made a presentation in May at the VII Environment Conference held by Santa Lucía Municipal Council. The presentation was entitled "Blue Growth: the Role of the Canary Islands as a European test bed for innovative projects".

And finally in May, PLOCAN participated in the MACSA project Congress entitled "Events and trends in protecting marine transport and the marine environment" organised by the Marine Sciences Technology Centre in the Nelson Mandela auditorium in Casa África. The director of PLOCAN sat on the congress technical committee and the manager moderated one of the panel discussions. The objective was to exchange know-how and experiences in the field of maritime transport and the marine environment among high-level representatives of the port and maritime administration of the Canary Islands, Spain, Senegal and Cape Verde, along with international agencies like the International Maritime Organisation (IMO) or the European Maritime Safety Agency (EMSA). They dealt with issues concerning protection and the environment in maritime transport, such as piracy, traffic tracking and control, the MARPOL convention and the prevention of marine pollution.

Two communications on submarine robotics were presented in September at the sixth international congress on marine technologies MARTECH, held in Cartagena. MARTECH is a benchmark forum in marine technologies in Spain. This congress covers the latest research and technological developments in

the field of marine robotics, operational oceanography, marine sensors, submarine images and communications, seabed mapping, renewable marine energies, aquaculture, structures and materials, etc. Moreover, it is a meeting point for the main research groups and companies in the sector on an international level.



Illustration 92. Pictures of MARTECH

In October, PLOCAN attended the New Energy Forum held in Brussels.

At the beginning of October, PLOCAN took part in the "Implementation of RIS3 priorities in blue growth" Workshop organised by ACIISI and the EC Smart Specialisation Platform. The objective of this event was to help provide support for launching instruments and programmes funded mainly (but not solely) by European Union Structural and Investment Funds, through the exchange of experiences and know-how between some of the regions and countries that have identified "Blue Growth" as one of their priorities in their RIS3. These regions have set this priority as a basic element for the future development of the region by creating and enhancing the competitiveness of their SMEs in this area in which these regions have identified an opportunity niche for the smart specialisation and development of their economy and society. Participants in the event visited the PLOCAN facilities after the congress closed.



Illustration 93. Visit by participants in theRis3 conference

At the end of October, PLOCAN attended the EXPOMAR trade fair in Mindelo with a view to promoting PLOCAN and the CANAUTIC project, and to explore new co-operation actions for the future with entities and institutions from Cape Verde and from other countries attending the event.



Illustration 94. Prime Minister of Cape Verde at the PLOCAN stand at EXPOMAR

In November, PLOCAN made an oral presentation at the opening session of the workshop on marine technologies organised by the Portuguese Hydrographic Institute at its head offices in Lisbon. The main objective of the workshop was to share know-how and identify opportunities for co-operation and business between institutions and companies from the public and private sector with ties with marine-maritime sciences and technology in the context of Blue Growth.



Illustration 95. Workshop on marine technologies in the Portuguese Hydrographic Institute

PLOCAN took part in the Canada-Europe working sessions held in Barcelona at the beginning of the month, organised by the EC, CSIS, Ocean Networks Canada, the IEO and Innovation Canada among others.

In November, PLOCAN also went to the EU-Brazil Atlantic Ocean Research Co-operation meeting that was aimed at driving the common development of scientific knowledge in the Atlantic Ocean and its dynamic systems. The question posed at this event was how to articulate joint research projects and improve two-way access to infrastructures; in short, driving co-operation between Brazil and Europe in the marine environment.



Illustration 95. Carlos Moedas from the EC at the conference held in Brazil

PLOCAN then went on to the AFRICAGUA 2015 trade fair in the context of the International Water and Renewable Energies Forum that was held in Puerto del Rosario (Fuerteventura). This trade fair offers a space where the opportunities offered by Africa for projects in the field of water and renewable energies are presented, along with the potential of the Canary Islands because of its proximity and location between three continents. PLOCAN promoted the potential of the Canary Islands in the field of off-shore renewable energy production.



Illustration 967. PLOCAN stand at Africagua

A presentation entitled "Trials in the development of marine energies, the PLOCAN approach" was made in November at the conference on the current state and prospects of Off-shore Renewable Energies in Spain. This conference was organised jointly by the School of Marine Engineering and the Marine APPA and the Spanish Maritime Technology Platform. The objective of the conference was to present the state and potential of these energies here in Spain.

In December, the manager of PLOCAN took part in the conference on "The sea, a place for meeting and opportunities" organised by the Canary Island Maritime Cluster in the rectory of the University of Las Palmas de Gran Canaria.

9. VISITS TO THE PLOCAN FACILITIES

Visits to the PLOCAN offices included the following:

In February, the ambassador of Norway to Spain, Johan Vibe, accompanied by a diplomatic mission from Norway, visited the PLOCAN offices in Taliarte. He asked about the projects and activities of the ICTS, in particular, about the actions that they are engaged in jointly with Norwegian companies, universities and research centres. During the visit, PLOCAN manager, Joaquín Hernández Brito, presented the Consortium's lines of action, he explained the co-operation activities with Norway and in later conversations they explored new areas of action for the future, placing special emphasis on the areas in which socio-economic activity can be promoted.

In March, the director and the manager of PLOCAN received the ambassador of the United States in Spain, James Costos, at the berth of the UNDIGEN device as part of the ambassador's visit to Gran Canaria, in particular to the Port of La Luz.



Illustration 978. The ambassador of the United States next to the UNDIGEN device

The manager then made a presentation to inform the ambassador about PLOCAN's training activities and their co-operation with several American research centres, in particular, with the Rutgers University of New Jersey, the Educational Passages programme, with schools in Maine, the Glider School activities about piloting gliders, the student exchange programmes and the scientific projects carried out jointly such as the Silbo glider voyage.

In July, the president of the Canary Island government, Fernando Clavijo Batlle, visited the facilities of the Canary Island Oceanic Platform in Taliarte accompanied by the minister of Economy, Industry, Energy and Knowledge of the Canary Island government, Pedro Ortega, the director of ACIISI, Juan Ruiz Alzola, the councillor for Economic Development, Energy and R+D+I of the Gran Canaria Cabildo (Island government), Raúl García Brink, the chancellor of the University of Las Palmas de Gran Canaria and the Mayoress of Telde, Carmen Hernández.



Illustration 989. Visit of the president of the Canary Island government

In the course of his visit, he greeted the PLOCAN staff and followed a detailed explanation given by the director of PLOCAN in the operation control room. The director explained the characteristics of the oceanic platform that is to be installed off the north-east coast of Gran Canaria, the activities carried out at PLOCAN and the technological and scientific development projects that the Consortium participates in. The visit finished in the facilities of the marine vehicles and instruments base, where the operations of the gliders and the glider school were explained to him.

In October, the ambassador of South Africa to Spain and the EU ambassador to Cape Verde visited the offices of the Canary Island Oceanic Platform, interested in discovering the marine science and technology activities that the Consortium is involved in and their objectives, aims and projection towards Africa in the field of marine-maritime science and technology and with respect to providing the scientific-technological community with more efficient conditions and means in the international context for conducting observations, experiences and trials at increasing depths on the oceanic platform and its surrounding area.



Illustration 99. The ambassador of South Africa with the director of PLOCAN and the chairman of the Canary Island Maritime Cluster

Lulama Smuts Ngonyama, South African ambassador to Spain, visited the PLOCAN facilities in the company of the director and the chairman of the Canary Island Maritime Cluster, Vicente Marrero

Domínguez. The objectives of the South African diplomat's visit included gaining first-hand insight into the technological development of marine sciences in the Canary Islands against a backdrop of the interest that there currently was in his country to promote activities related to the economy of the sea in line with the growth of the blue economy.

The European Union's ambassador to Cape Verde, José Manuel Pinto Teixeiro, also visited the PLOCAN offices on the same day, where he saw the main facilities, operations room, glider laboratory and he asked about the Consortium's activities. In particular, the EU ambassador to Cape Verde was interested in the activities that PLOCAN carries out with institutions and the government of Cape Verde in the context of transnational PCT-MAC collaboration.



Illustration 100. The European Union's ambassador to Cape Verde with the director of ACIISI in the glider laboratory

Finally, also in October, as mentioned in the previous section, delegates to the "Implementation of RIS3 priorities in blue growth" workshop organised by ACIISI and the EC Smart Specialisation Platform visited PLOCAN's facilities.



Illustration 101. Visit to the glider laboratory (RIS3 conference)

Other visitors have come to PLOCAN's facilities in the course of the year. Some of these are listed below:

January:

Visit by a delegation from Uzbekistan

March:

Visit by representatives from the Cantabria Hydrographic Institute

Visit by the trade attaché of the US embassy

Visit by a delegation from the Japanese prefecture of Iwate

July:

Visit by a delegation from South Korea

October:

Visit by delegates to the RIS3 conference organised by ACIISI

December:

Visit by Professor Kangki Lee (World Ocean Forum)

Visit by a delegation from Uzbekistan

10. ASSOCIATION AND CORPORATE ACTIVITIES

PLOCAN belongs to and/or participates in co-operation initiatives in different areas:

- The PLOCAN oceanic observatory (ESTOC) is one of the Spanish nodes of the European observatory network EMSO (European Multidisciplinary Seafloor and Water Column Observatory) and FixO3 (the European Fixed Open-Ocean Observatories Network).
- PLOCAN belongs to the robotics and automation group and the maritime safety group of the Spanish Maritime Sector Technology Platform.
- Member of TP OCEAN, European technology and Innovation Platform for Ocean Energy and the Ocean Energy Forum for galvanising the marine energy sector in Europe
- Member of the European ocean energy association (ocean energy Europe)
- Member of the Spanish Standardisation and Certification Association (AENOR) through its Sub-committee AEN/206/SC114.
- Member of the Association of Renewable Energy Producers APPA Marina.
- Member of the international network of innovative maritime territories comprised of Spain, France, Germany, Italy, Argentina, Mexico, United States, China and Vietnam, amongst others.
- Founding member of the University of Las Palmas de Gran Canaria "Energy and Sustainability School".
- Member of the Macaronesia Marine Maritime Cluster Steering Committee.
- Member of the organisation appointed as Spanish representative on the standardisation group International Electrotechnical Commission (IEC) / TC114: Marine energy - Wave, tidal and other water current converters, Sub-committee:114/136: Acoustic characterisation of marine energy converters.
- Member of the FECYT EURAXESS network related to research mobility, as a "EuraxessContact Point".



Illustration 102. Photo of the bi-annual Euraxess conference

PLOCAN also takes part in the following forums and working groups:

- EuroGOOS HF-Radar Group, led by EMODNET Physics (<http://www.emodnet-physics.eu/hfradar/Home>)
- Scientific Access Committee of the EU-TNA Glider Programme.
- National co-ordinator of the AEN/CTN 206/SC 114/GT 10 "Evaluation of mooring systems for wave energy converters".
- Atlantic Stakeholder Forum for driving blue growth in the European Atlantic Arc
- Galway Statement Implementation to define blue growth-related strategy in the European Atlantic context
- Programme Committee of Oceans of Tomorrow Projects to assess progress, contributions and the impact of the projects financed by the European call for projects Oceans of Tomorrow.
- Ocean Energy Forum to drive the off-shore energy sector in Europe.
- Participation in the H2020 Project Coordinators' Day for strategic planning, monitoring and assessing the results of the H2020 programme
- GTEO-Wave Energy Working Group to drive technological progress and the application of energy generating devices using waves. The GTEO is driven by the EVE.
- Ocean Energy ERA-Net Consortium to drive the renewable off-shore energy sector in Europe.
- FP-7 JERICO General Assembly to create a joint initiative of European coastal observation infrastructure.

11. PUBLICATIONS, COMMUNICATIONS TO CONFERENCES AND OTHER DISSEMINATION ACTIVITIES

In 2015, PLOCAN personnel participated in the following publications, communications to conferences and other dissemination activities:

Conferences:

- Eduardo Quevedo, Jesús de la Cruz, Luis Sánchez, Gustavo M. Callicó and Félix Tobajas, "Variable Size Block-Matching Super-Resolution Applied to a Multi-Camera System", Institute of Electrical and Electronic Engineers (IEEE) International Conference on Consumer Electronics, Las Vegas, EEUU, pp. 662-663, January 2015.
- E. Delory, E. Quevedo, D. Alcaraz Real-Arce, C. Barrera, J. Hernández, O. Llinás, T. Lockhart and M. Gadel, "Multi-purpose offshore platforms environmental monitoring, safety and security, a joint strategy from the FP7 TROPOS, NeXOS and PERSEUS Projects", IEEE MTS (Marine Technology Society) OCEANS 15, Genoa, Italy , pp. 1-4, May 2015.
- Daniel A. Real-Arce, Carlos Barrera, J. Hernández and O. Llinás, "Ocean Surface Vehicles for Maritime Security Applications", IEEE MTS (Marine Technology Society) OCEANS 15, Genoa, Italy, pp. 1-4, May 2015.
- T. Morales, C. Barrera, A. Cianca, R. Morán, M.J. Rueda and O. Llinás, "PLOCAN. Gliderport Activities and Training Facilities", International Ocean Glider Community Workshop 2015, Norwich, United Kingdom, poster, May 2015.
- TD. Mihai Toma, J. del Río, N. Carreras, L. Corradino, P. Braulte, E. Delory, A. Castro and P. Ruiz, "Multi-platform underwater passive acoustics instrument for a more cost-efficient assessment of ocean ecosystems", International Instrumentation and Measurement Technology Conference, Pisa, Italy, pp. 969-974, May 2015.
- Daura Vega Moreno, Eduardo Quevedo, Octavio Llinás and Joaquín Hernández-Brito, "Project-based learning using robots with open-source hardware and software", II Ibero-American Conference on educational innovation in the scope of ICT, Las Palmas de Gran Canaria, España, November 2015.
- Martín-Rodríguez, A.J., Babarro, J.M.F., Lahoz, F., Sansón, M., Martín, V.S., Norte, M., Fernández, J.J. Actividades y modos de acción de sales de alquitrán trifenilfosfonio. XIX Semana Científica "Antonio González". La Laguna, Spain, October 6-9, 2015.
- 2. Reyes-Batlle, M., Girbau, C., Martín Rodríguez, J., Martín-Navarro, C.M., López-Arencibia, A., Sifaoui, I., Wagner, C., Fernández-Astorga, A., Valladares, B., Martínez-Carretero, E., Piñero, J.E., Lorenzo-Morales, J. Variaciones en la cultivabilidad de *Campylobacter jejuni* y *Vibrio harveyi* en presencia de *Acanthamoeba Neff*. Oral communication by M.R-B. II International conference of Spain, France, Italy and Portugal parasitologists. Vitoria, Spain, July 23-25, 2015.
- Martín-Rodríguez, A.J., Álvarez Méndez, S. J., Martín, V.S., Fernández, J.J. Novel Quorum Sensing disruptors and their antifouling implications. Oral communication. I International Symposium on Quorum Sensing Inhibition and Satellite Meeting on Novel Antifouling Strategies. Santiago de Compostela, Spain, June 3-5, 2015.
- Martín-Rodríguez, A.J., Álvarez Méndez, S. J. ¡Luces fuera! Vinil éteres como inhibidores de bioluminiscencia en la comunicación celular bacteriana. Oral communication by S.J.A-M. XI Conference of students of the Chemistry Section, La Laguna, Spain, April 13-15, 2015.

Publications:

- E. Quevedo, L. Sánchez, G. M. Callicó, F. Tobajas, J. de la Cruz, V. de Armas and R. Sarmiento, "Super-Resolution with selective filter based on adaptive window and variable macro-block size", Journal on Real-Time Image Processing, JCR = 2.02, 10.1007/s11554-015-0489-3, ISSN: 1861-8219, Februrary 2015.
- E. Quevedo, J. de la Cruz, L. Sánchez, G. M. Callicó, and F. Tobajas, "Super Resolution with Adaptive Macro-Block Topology Applied to a Multi Camera System", IEEE Transactions on Consumer Electronics, JCR = 1.157, ISSN: 0302-9743, May 2015.
- Joaquín H. Brito, Eduardo Quevedo and Octavio Llinás, "Multi-Use Offshore Platforms for the Future Society: First Designs in the Scope of the FP7 TROPOS Project", The Journal of Ocean Technology, ISSN: 1718-3200, December 2015.
- Martín-Rodríguez AJ, Babarro JMF, Lahoz F, Sanson M, Martín VS, Norte M, Fernández JJ. 2015. From broad-spectrum biocides to Quorum Sensing disruptors and mussel repellents: antifouling profile of alkyl triphenylphosphonium salts. PLoS One 10(4): e0123652.
- Martín-Rodríguez AJ, Ticona JC, Jiménez IA, Flores N, Fernández JJ, Bazzocchi I. 2015. Flavonoids from Piper delineatum modulate Quorum-Sensing regulated phenotypes in Vibrio harveyi. Phytochemistry 117: 98-106.
- Cen-Pacheco F, Santiago-Benítez A, García C, Alvarez-Mendez S, Martín-Rodríguez AJ, Norte M, Martín VS, Gavín JA, Fernández JJ, Daranas, AH. 2015. Oxaquilenoids from Laurencia viridis: combined spectroscopic-computational analysis and antifouling potential. J Nat Prod 78(4): 712-721.
- Martín-Rodríguez AJ, Quezada, H, Becerril-Aragón G, de la Fuente-Nunez C, Castillo-Juarez I, Maeda T, Wood TK, García-Contreras R. Recent developments in novel bacterial anti-infectives, in Frontiers in Clinical Drug Research - Anti-Infectives. Atta-Ur-Rahman, Ed. Bentham Science, 2015 (in press).
- Martín-Rodríguez, A.J. and Fernández, J.J. 2015. A bioassay protocol for Quorum Sensing studies using Vibrio campbellii. Bio-protocol (in press).

Diffusion journals and bulletins:

- Ayoze Castro, Eduardo Quevedo and Silvia Hildebrandt, "Project management integral system in PLOCAN: PRINCE2 + Daptiv, a common strategy", ITProiectus,ISSN: 2340-9363, July 2015.
- Interview to Octavio Llinás, Marine energy bulletin (2º semestre) published by the Spanish office of brands and patents.

Master's dissertations:

- Eduardo Quevedo, master dissertation in Astronomy and Astrophysics, "Application of LuckyImaging in Multi-camera systems", Universidad Internacional de Valencia, España, November 2015
- Tania Morales, master dissertation in Telematic Engineering, "Development of web services for the Oceanography community", Universidad de Vigo, July 2015

Doctoral thesis:

- Eduardo Quevedo, "Contributions to the super-resolution process through selective filters techniques, adaptable macroblocking topology and multi-cameral systems", Universidad de Las Palmas de Gran Canaria, June 2015
- Carolina Llerandi García, "Contributions to validation, verification and calibration of instruments for Oceanography", Universidad de Las Palmas de Gran Canaria, July 2015

12. CORPORATE SOCIAL RESPONSIBILITY

PLOCAN bases its CSR on the report on socially responsible practises published annually by the Secretariat of State for Public Administrations of the Ministry of Finance and Public Administrations, thus explaining the initiatives and actions relating to the preservation of the environment, the continual progress made in the area of rights and the development of employment policies applicable to employees and advances made in the area of efficiency and service quality.

The Parliamentary Sub-committee's report to promote CSR defines corporate social responsibility in the following manner:

"Corporate social responsibility, apart from strict compliance with the legal obligations in effect, is the voluntary integration by the company of the social, labour, environmental and human rights concerns that stem from the relations and transparent dialogue with its stakeholders in its governance and management and in its strategy, policies and procedures, thus assuming responsibility for the consequences and impacts stemming from its actions".

In its meeting of the 24th of October 2014, the Council of Ministers approved the Spanish Corporate Social Responsibility Strategy 2014-2020. This document, in compliance of the aforesaid additional provision, commits not only companies, but also public administrations and other organisations to move towards a more competitive, productive, sustainable and integrating society and economy.

This is a document that gives Spain a common framework of reference and will bring harmonisation to the different actions that are being developed in matters pertaining to Social Responsibility in both the public and the private sector. It is not just limited to companies, it also intends to promote the development of responsible practices in the Public Administrations and in public and private organisations with a view to constituting the driving force that guides the transformation of the country towards a more competitive, productive, sustainable and integrating society and economy.

Hence the Spanish Social Responsibility Strategy meets the recommendations set forth in the European Union Renewed Strategy on Corporate Social Responsibility (CSR), which urges member states to drive national policies in CSR matters. The draft Strategy was approved in a plenary session of the State Corporate Social Responsibility Council (CERSE, as it is known in Spanish) held on the 16th of July 2014 and was made available to the public.

The issues tackled in Social Responsibility can be divided into three blocks:

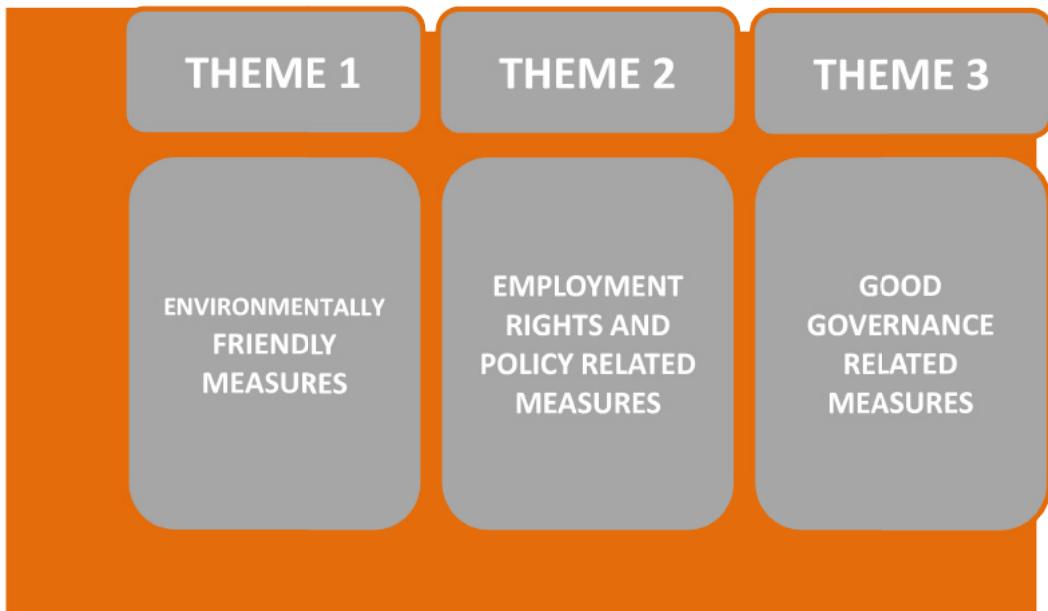


Illustration 103. Classification of the CSR actions

The implementation of actions aimed at CSR compliance continued in 2015. These measures are taken on board in both the PLOCAN annual action plan and in the CSR plan itself.

In the case of Strand 1 measures, some of these concern the management and the internal operations of the Consortium and others the marine-maritime scientific-technological activities. These measures include:

- Developing an environmental surveillance plan for construction, going beyond the obligations established by the environmental impact statement.
- Continual environmental monitoring of the test bed.
- Energy-saving measures relating to climate control and office equipment.
- Measures aimed at reducing paper consumption.
- Measures aimed at rolling out selective waste sorting and raising awareness among the staff.

Strand 2 includes measures aimed at improving the welfare and working atmosphere of employees. Those rolled out in 2015 include:

- Training actions. Preparation and annual assessment of the training plan.
- Measures aimed at motivating the staff in the vision and awareness of the objectives of the project.
- Promote health and safety beyond strict compulsory compliance.
- More flexible working hours.
- Work resources and systems that provide ideal conditions.
- Work in co-ordination with shop stewards on enhancing the working atmosphere.
- Improve communication. Make information of interest to employees available on the intranet.

Strand 3 includes measures relating to good governance. These include:

- UNE ISO 9001 quality standard certification in accordance with the senior management's firm commitment to quality.
- Roll out an integrated management system in accordance with UNE-EN ISO 9001:2008 standard (certified in 2015), ISO 14001:2004 (environment) and OHSAS 18001:2007 (health and safety) in PLOCAN offices and services on-shore.
- Implement the CSR plan itself.
- Interact with the people and with stakeholders. Develop and improve the communications plan. *Stakeholder service*.
- Foster scientific-technological vocations.
- Co-management of infrastructures with other institutions and generate synergies in the use of resources.
- Co-operation with public and private entities. Propitiate the signing of national and international co-operation agreements with public and private entities.
- Roll out documental working and management systems that promote collaborative work among members of the organisation and with third parties.
- Propitiate the exchange of know-how and the temporary mobility of people with other institutions.
- Propitiate attracting new projects that provide the Consortium with additional funding.
- Increase the kind and number of services.
- Assess project management.
- Update and maintain documented working procedures.

13. MANAGEMENT SYSTEM

In 2015, PLOCAN obtained certification for its quality system pursuant to UNE-EN ISO 9001:2008 standards after a process of adaptation that started in 2014. Apart from setting up a quality unit to ensure compliance of legal requisites and the ISO 9001:2008 standard, this also meant continual improvement of the organisation as a whole. The main core of certification is constituted by training activities and transversal activates are directly affected, such as procurement management (procurement, selection, hiring and managing suppliers) and personnel management (selection, hiring, training and monitoring the skills of the staff).

PLOCAN's definition of quality combines a concern for doing it as well as possible and for constant improvement, with a view to complying with the requisites of our customers, as well as legal and regulatory requisites. Quality is a direct commitment of the senior management as they have declared in the quality policy appended to the organisation's quality manual. PLOCAN pursues maximum quality and customer service objectives in its activities, which focus on helping the best research, development, technological development and innovation to reach the market as soon as possible to produce economic growth and jobs by providing efficient access to the ocean at increasing depths in an environmentally-friendly manner.

The regional director for the Canary Islands of the SGS group, Juan G. Argenti Biering, and the director of Certification of the SGS group, Héctor González Álvarez, awarded the certification accrediting the ISO 9001:2008 standard to the director of PLOCAN, Octavio LLinás.



Illustration 104. Awarding the quality certificate to the director of PLOCAN

In order to extend the main core of certification and include compliance with environmental and health and safety standards, an Integral Management System started to be rolled out in the second half of 2015. This system is governed by ISO standards 9001:2008 (quality), ISO 14001:2004 (environment) and OHSAS 18001:2007 (health and safety), and they are applied in the offices and services of PLOCAN on-shore. The system was prepared in order to have the facilities certified the following year by an accredited agency.

The integral management system is being rolled out with the intention of optimising the management of the organisation by ensuring the quality of each and every one of the processes. In the short term, it is a process that requires a major effort but it will bring great organisational and operational benefits to the organisation in the future.

14. PLOCAN IN NUMBERS

Below is an analysis of the most important figures as far as budgetary spending 2015 goes.

REVENUES AND CONTRIBUTIONS 2015

On the revenues and contributions side for 2015, the total figure amounts to €21,982,876.34.



Illustration 105. Summary of revenues and contributions

One of the highpoints of the revenues are those arising from ordinary allocations from the members of the consortium (Ministry of Economy and Competitiveness and the Canary Island Government - €2,108,803.00), revenues earned during the year from PLOCAN's participation in R+D+I projects, revenues from national and international bodies; centres and business and financial revenues.

EXPENDITURE AND INVESTMENTS 2015

On the expenditure and investment side for 2015, there is a large sum from the acquisition of fixed assets amounting to €5,283,846.90. This sum includes the payments made over the year with regard to the Construction of the Platform.

PERSONNEL	€ 1,065,552.90	TOTAL € 21,982,876.34
CURRENT EXPENSES, GOODS AND SERVICES	€ 810,061.31	
ACQUISITIONS AND FIXED ASSETS	€ 5,283,846.90	
TRAINING	€ 54,512.02	
PROJECT EXPENSES	€ 1,013,564.22	
TAXES	€ 117,629.17	
RESERVES PENDING APPLICATION	€ 13,637,709.82	

Illustration 106. Summary of expenditure and investments

The major items are personnel expenses (€1,065,552.90) and expenses stemming from the execution of R+D+i projects (€1,013,564.22).

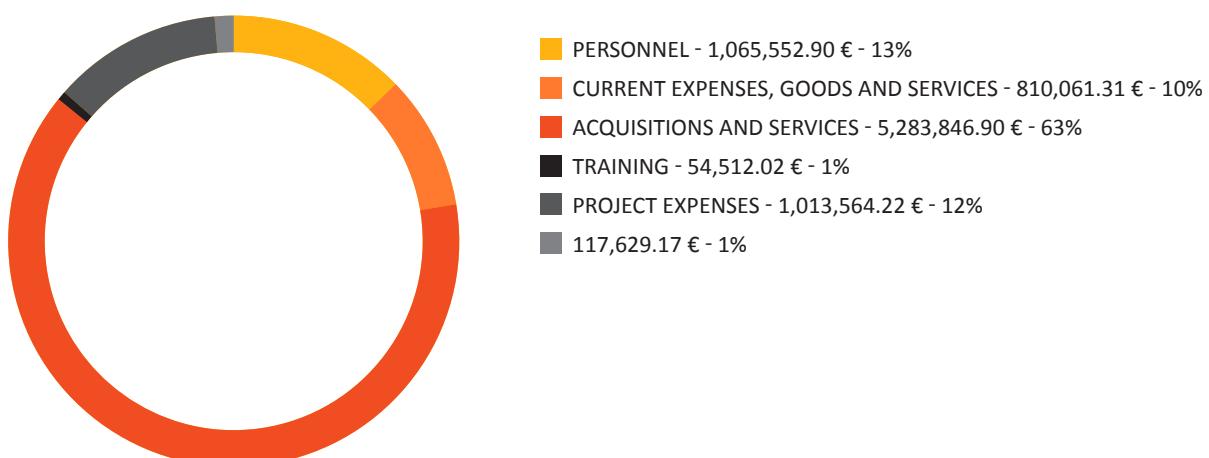


Illustration 107. Graph of expenditure and investments



PLATAFORMA OCEÁNICA DE CANARIAS

