ALL-ATLANTIC OCEAN RESEARCH ALLIANCE

Creating an Atlantic Ocean Community by Implementing the Galway and Belém Statements

AA-MARINET Report:

Collaboration web-portal design and implementation

BUILDING AN ALL ATLANTIC OCEAN COMMUNITY
Implementing the Belém Statement

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ALL-ATLANTIC JOINT PILOT ACTIONS

Following a year-long collaborative process among more than 70 stakeholders at the Atlantic level, the All-Atlantic Ocean Research Alliance Multi-Stakeholder Platform, divided into 5 sub-multi-stakeholders platforms, identified more than 1000 initiatives towards strengthening marine research and innovation collaboration at the Atlantic level, 56 gaps and 79 needs/recommendations to achieve the All-Atlantic Ocean Research Alliance ambition, guided by a total of 20 Strategic Objectives, 20 Operational Objectives, and 10 Key Performance Indicators.

Based on these findings and on the idea of collaboration, alignment, and use of existing resources, they have developed six ambitious and long-term collaborative Joint Pilot Actions:

- All-Atlantic Training Platform (AA-TP)
- All-Atlantic Aquaculture Technology and Innovation Platform (AA-ATiP)
- All-Atlantic Marine Biotechnology Initiative (AA-BIOTECMAR)
- All-Atlantic Data Enterprise 2030 (AA-DATA2030)
- All-Atlantic Blue Schools Network (AA-BSN)
- All-Atlantic Marine Research Infrastructure Network (AA-MARINET)

This report is developed by the All-Atlantic Marine Research Infrastructure Network (AA-MARINET) Joint Pilot Action, that provides tools to support a transatlantic network of Research Infrastructures initiatives, promoting Trans-National Access and other methods for sharing infrastructures in the Atlantic area. It will work as a platform where stakeholders can share information about planned observation activities and available spare capacities, creating a forum where thematic networking and synergies will bring a better articulation of infrastructure-related activities in the Atlantic basin, improving the support of multidisciplinary science to address global societal challenges.

This report is a deliverable in scope of AA-MARINET task2 “Design of web portal structure and implementation” that aimed at the design and implementation of a collaboration web portal that boost the development of synergies and articulation between the different actors responsible for the conduction of observation actions and operation of observation infrastructures in the All-Atlantic domain.

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TABLE OF CONTENTS

CONTENTS

AANChOR is a Coordination & Support Action project aimed to support the implementation of the Belém Statement. It has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 818395.

SUMMARY

In the framework of AA-MARINET Joint Pilot Activity (JPA), a web portal was designed and implemented with the specific aim of improving the potential to develop collaborations and synergies between the different communities involved in the observation of the All-Atlantic domain. The AA-MARINET collaboration portal was developed in the framework of AA-MARINET JPA TASK2, from a close collaboration between Instituto Hidrográfico (IH, Portugal), COPPE-Universidade Federal do Rio de Janeiro (Brasil), Atlantic International Research Centre (AIR Centre, Portugal), Universidade Federal de Pernambuco (UFPE, Brasil), and Institut Français de Recherche pour L'Exploitation de la Mer (IFREMER, France). This report describes the work developed, starting from the refinement of the mains concepts behind the vision of a collaboration web portal and progressing throughout the different phases, from the web portal design to the its implementation and installation for operational use.

The collaboration portal is accessible through the AA-MARINET portal: https://www.aa-mari.net/collaboration-portal-general-info/

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1. Introduction

The "All-Atlantic Marine Research Infrastructure Network" Joint Pilot Action (AA-MARINET) was developed under AANChOR WP7 (Alignment and Convergence of Research and Innovation Infrastructure Initiatives), with the aim at creating a long-term collaboration framework to promote and facilitate the convergence and the alignment of Research and Innovation infrastructure initiatives in the All-Atlantic domain. AA-MARINET aims to provide a forum and tools to support the development of a transatlantic network of research infrastructure (RI) initiatives and promote Trans-National Access (TNA) and other methods for sharing infrastructures in the Atlantic area, thus supporting the implementation of the Belém Statement.

To promote a first level approach and engagement between partners, a web portal to unlock the potential for articulation of the observation activities conducted in the Atlantic basin was proposed to be developed as part of AA-MARINET. This "collaboration portal" was intended to be transversal to all types of observing systems and to all geographical domains and timescales, and to provide information on ongoing/planned activities at sea. The information provided could then be used by a broad variety of users (scientists, RI operators, Blue Economy actors or crises managers, among others) to search for complementarities and/or cooperation opportunities and development of synergies.

The work developed to refinement the concepts behind the originally proposed vision of a collaboration web portal and to design, implement and operationalize such a portal was conducted in the framework of AA-MARINET Task 2 ("Design of web portal structure and implementation"), coordinated by Instituto Hidrográfico (Portugal) with the contribution of COPPE/Universidade Federal do Rio de Janeiro (Brasil). In fact, as we will see in section 3, a larger team was involved in the discussions leading to the final concept and design of the web portal.

Under the seed funding period of the AA-MARINET JPA by the AANChOR project, it was proposed that the web portal will be fully operational and tested at the level of the AANChOR community. In this report the different phases of development of the proposed work, the main achievements and main difficulties will be described.

The Challenge

A large diversity of programs of observation occur, each year, in the All-Atlantic basin. These observation activities are conducted by many different entities (including academia and research institutions, governmental agencies, private companies of the Blue Economy sector and others). They extend over diverse geographical domains and aggregate many different strategies, from basin wide coverages to high-resolution coastal ocean measurements. And they involve a large variety of measuring systems such as research vessels, autonomous vehicles (AUVs, UAVs), underwater gliders, fixed platforms, HF radars, surface and subsurface drifters, opportunity ships or citizen science programs.

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Most often, the different actors involved in these observation activities in the All-Atlantic domain are not informed about the others initiatives that may occur in the same geographical areas and during the same time window. Consequently, the full potential contained in those different observation efforts focusing one common area is not extracted and opportunities to cooperate and build a comprehensive view of the All-Atlantic domain are lost.

The challenge that AA-MARINET Task 2 addressed was to improve the way the information about the different observation initiatives conducted in the All-Atlantic domain flows between the different key actors for those initiatives, so that the articulation between these actors and the development of synergies is promoted. This would significantly contribute to optimize observation efforts, to increase the scientific knowledge that is derived from those efforts and to boost scientific and technological research in the AA-Atlantic domain.

Why an AA-MARINET Collaboration Portal?

Different strategies were conducted in the framework of AA-MARINET to address the basic aspects of the previously stated challenge, namely the coordination between different actors involved in the observation of the All-Atlantic domain. Task 2 proposed to answer this challenge by the implementation of a collaboration web portal that would provide an environment designed specifically to bring together the broad community involved in ocean observation, thus facilitating the identification of opportunities for collaboration and the contact between the different actors.

The basic motivation behind the recognition of the interest that such a portal could present comes from the direct experience of different partners involved in Task 2, themselves responsible for the conduction of observation actions in the Atlantic. At several occasions, in discussion with other colleagues after the conduction of a multidisciplinary action in a given geographical area, we recognize that a simple opportunity for collaboration, for example to integrate a specific sensor in our systems that would increase the range of measurements collected, was missed because we have not mutually be alerted for planned activities and available equipment's to share. Another example of this lack of articulation occurs when unmanned vehicles (e.g. underwater gliders, surface or underwater autonomous vehicles) cross a given geographical area of the Atlantic and there is no articulation with other observation actions that are being conducted nearby, either by permanent monitoring infrastructures installed (e.g. multi-parametric buoys offshore or coastal High Frequency radars along the coast) or during multidisciplinary surveys.

This lack of articulation not only reduces the potential for extracting from observations an in-depth understanding of the Atlantic Ocean conditions and processes, but can also have important operational impacts. During crisis at sea (an accident with release of contaminants to the marine environment, for example) the few observations that can be available in the area of the crisis can play a critical role in improving the forecasts skills of models that are being used to plan the mitigation actions. In a less critical

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perspective, an operator of an equipment that presented a critical failure (for example, a glider crossing the Atlantic) can readily benefit from knowledge about the observations actions developing nearby and from articulation with the teams involved in those action to explore potential capacity to provide support.

Our vision was that this lack of communication could be mitigated by the implementation of web portal that could provide an easy-to-use environment in which the communities involved in the observation of the All-Atlantic domain could identify and be alerted for ongoing or planned actions, for infrastructures available be shared or for crisis developing in their areas of activity and for which they can provide support. Being a light and easy to use tool, this portal can, we think, promote articulation between the broad range of communities involved in the All-Atlantic domain, contributing to create real synergies between the different actors from these different communities. In particular it can be a particularly useful tool to promote the articulation between many different Trans-National Access (TNA) that are being conducted in the All-Atlantic domain.

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2. Collaboration Portal Concept

In order to incorporate a diversified range of capacities able to promote the interactions between the target communities involved in the observation of the All-Atlantic observation domain, the AA-MARINET collaboration portal was designed based in a number of basic assumptions, described in this section.

Main Goals and Functionality Requirements

The main objective of the collaboration portal is to promote the articulation between observation activities or the identification of available infrastructures in the All-Atlantic. In this perspective, the web portal should provide an easy to use and intuitive environment. In particular, it should provide an easy and geographically referenced way to display the observation activities or available infrastructures that are being developed or that are planned for the future. Actions that were developed in the past and that have no longer chance to articulate with present or planned actions are no longer present in the AA-MARINET collaborative portal.

Users of the AA-MARINET collaboration portal want to know about observation activities being developed in their geographical areas of interest or of observation infrastructures that would be available in those areas. This implies that the portal must provide a way for users (independently of their typology, as discussed in the next sub-section) to indicate which is their geographical area of interest. Also, to be effective, the collaboration we portal should work in reactive mode, not in passive mode. Meaning that it is not to the user to be searching regularly in the portal to identify new opportunities to collaborate but it is rather to the portal to notify the user as soon new observation activities or new available infrastructures are inscribed in its geographical area of interest.

The web portal should clearly allow the user to identify which collaboration opportunities and synergies present to him and how he can establish the interactions to progress in the realization of these opportunities.

Finally, as described previously, the web portal should specifically address the key importance of interaction with observation activities in the framework of support during a crisis at sea.

Geographical Domain of Application

The geographical domain focused in the AA-MARINET collaboration portal, and in which the articulation of observation activities or identification of available infrastructures for sharing in promoted, is the All-Atlantic domain. Although we consider areas of potential interactions between the Atlantic and adjacent basins (for example between the Atlantic and the Pacific, or between the Atlantic and the Mediterranean) the focus at this stage of implementation of the portal is on the Atlantic activities.

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Modalities of Interaction

The AA-MARINET collaboration portal will provide to users a number of tools to boost the potential for interactions in 4 main areas, 3 of which are of open (public) access and the last one are of restricted access. These areas are:

AREA1: ACTIONS – The most important of these areas, and the one for which the most extended capacities need to be available, is the area of Observation Actions or simply ACTIONS. These correspond to the focus of the AA-MARINET collaboration portal. They comprise a large multiplicity of activities of observation. Some of these ACTIONS are developed during well-defined time periods (such as multidisciplinary observations conducted during research cruises), others correspond to permanent activities (such as the observations collected by monitoring infrastructures). Some are conducted by the research community others by different communities, for example by actors of the Blue Economy (such as measurements from instruments installed in offshore aquacultures or energy plants) or by the general public (Citizen Science programs).

The capacities to be implemented in the web portal should be designed to help the way in which these ACTIONS are known by the different communities involved in observation activities in the All-Atlantic domain. They should support and facilitate the interactions between the ACTIONS managers and the rest of the broad community.

AREA 2: INFRASTRUCTURES – In addition to observation ACTIONS, the web portal should also present to users the panorama of available Observation Infrastructures, or simply INFRASTRUCTURES, that may be available to be shared between the All-Atlantic communities. The portal should provide the points of contact with whom the user can interact to explore the potential of sharing these INFRASTRUCTURES.

AREA3: COMMUNITY – By opening an environment that is designed to bring together the different communities engaged in the observation, the collaboration web portal should be also profited to exchange, between the different users, other information that can contributes to reinforce the sense of an All-Atlantic community. In this perspective, a third area of interaction should be implemented in the portal to include the interaction tools to these other topics of interest among the Observation Community of the All-Atlantic (or simply the COMMUNITY).

AREA 4: CRISES – The fourth area of interaction aims to take advantage of the capacities of the AA-MARINET collaboration portal to rapidly identify observation ACTIONS that are being conducted in the All-Atlantic domain and that can be mobilized to provide some level of support during a crisis at sea. The portal should be designed so that, in the eventuality of a crisis that develops in a specific geographical area, the different responsible for the conduction of observation ACTION be alerted for that crisis and for the support that is required. The portal also opens a direct channel through which these ACTIONS managers can rapidly interact with the responsible for the management of the CRISIS, to evaluate how support can be provided.

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This area of interaction is not a publicly open area, the information regarding the crises are restricted to the responsible of ACTIONS that can, in fact, provide support.

The Communities that should be Addressed

Our goal being to optimize the observation efforts in the All-Atlantic domain, by articulation of the different efforts, the strategy to implement should not be restricted to the research community but instead should comprise the different actors directly involved in the ocean observation or that can contribute to it. Besides the research community, these also include Blue Economy operators such as managers of aquacultures or of energy exploration plants, which maintain some level of observation in their facilities. These can profit from the existence of nearby observation action to expand the monitoring of environmental conditions affecting their operations in specific periods or to understand better the evolving conditions. In return, their own observations can be of relevance to complement, for example, observations conducted as part of a research program.

A second community that should also be addressed (and engaged) in the collaboration web portal are the community of governmental organizations that, at national or even local levels, are conducting or coordinating observation programs in their national waters. These include, for example, organizations responsible for the management of protected areas and also entities that are responsible for the implementation of main directives and other legislation. For these users, the information that can be provided by the AA-MARINET collaboration portal can contribute to a key increase of the environmental information that could be available to support or understand the more national or local questions. The portal will not directly identify measurements or data sets that could be used by these users. But the interaction can, eventually, articulate the effort so that, for example, an observation action that is being conducted in the proximity of a marine protected area can be adjusted (with mutual benefit) in order to optimize the information that would be available to characterize and understand that area.

A particularly interesting community to be addressed by the portal capacities is the community of users involved in Citizen Science programs. The articulation of these programs with the other observation programs that are conducted by the research community, partners in the Blue Economy or governmental entities, is a challenging task but should lead to important possibilities to extend the observation efforts and community synergies in the All-Atlantic domain.

Finally, and as discussed before, a community that should also be specifically contemplated in the design of the collaboration portal is the community of managers of crises at sea. While not necessarily directly involved in observation activities, this community can directly beneficiate from the rapid identification of observation actions developing in the areas near the crises and from the articulations that can be established.

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The collaboration portal can be particularly useful to provide support to crises in two different contexts. In the case of environmental crises or accidents, the management of the crisis can directly benefit available information that are being collected in the geographical area in which the crises develop. These crises scenarios include, for example, events impacting the marine environment such as catastrophic releases of contaminates to the marine environment (e.g. oil spills or contaminant events from industrial plants in the coastline or transported by river plumes), the development of harmful algae blooms episodes or the managements of crises associated with Search and Rescue operations, among others. All these situations require the best possible assessment of the present environmental conditions and accurate forecasts of the evolution in time of these conditions, which can be obtained from a variety of numerical models with data assimilation. The identification of existing observations in the area were a crisis of this type is occurring, and the possibility to articulate with the responsible for these observations, would contribute decisively to improve the observations available to improve forecasts from data assimilation models, for example.

A second type of crises are directly related with the observation activities themselves. This can occur when an observing system is affected by a malfunction and needs to be recovered or, simply, to be monitored at surface. For example, a glider conducting a section along the Atlantic section and affected by a technical problem can remain at surface and drifting away. The portal can potentiate the articulation with a ship the is eventually conducting observations in the same geographical area, leading to a recovery operation or, at least, to a monitoring of the conditions of the equipment that could lead to the resolution of the problem.

Typologies of Users

Taking in account the different areas of interaction contemplated in the web portal and the different communities to which the portal is designed to address, the following step in the portal concept was to define a set of user profiles or typologies, each one requiring a specific level of access to the available tools. The typologies that the users should address are:

Typology 1: GENERAL USER

The most general category of users that can access the collaboration web portal correspond to users that, although not directly responsible for the conduction of observation actions or by the management of infrastructures that can be shared, have a specific interest in knowing about these topics and or exchange other complementary information with the Community. These users should be able to access the visualization tools that are implemented in the portal for the modalities of ACTIONS and INFRASTRUCTURES and to use the intercommunication vehicles available for the COMMUNITY. To improve these interactions, a system that alert these users for the inscription of new observation actions in the user geographical area of interest should be implemented.

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The General User profile should correspond to the standard user profile to be assumed when a users registers in the AA-MARINET collaboration portal.

Typology 2: ACTION MANAGER

Users that are responsible for the conduction of observation actions in the All-Atlantic domain (or in domains closer enough to potentiate the development of articulations) are, in addition to the General User profile, also classified and registered with the ACTIONS MANAGER profile. These users are typically the Principal Investigators of multidisciplinary surveys, the responsible for a multisystem monitoring infrastructure, the responsible person for the monitoring systems installed in a Blue Economy operation or the responsible for coordinating a Citizen Science program.

The two specific goals of the AA-MARINET collaboration portal regarding users with the ACTIONS MANAGER profile should be:

(1) to inform that other ACTIONS are inscribed for the same time periods and in a geographical area which is close enough to potential a collaboration

(2) to bring in contact the responsible for each ACTION with potential to articulate, so that they can communicate and evaluate the interest and feasibility for that articulation.

For the sake of effectiveness in accomplishing these main goals, it is important that one single person be identified as the point of contact for each specific ACTION. This person (the ACTION MANAGER), by its role in leading the overall components of the ACTION, is the one that can correctly evaluate the degree of articulation that can be envisaged with other ACTIONs inscribed in the portal and in which work components this articulation can be developed. Once the interaction between this person and the responsible person for another ACTION is established, the portal accomplished its main goal. The subsequent interactions between the two groups, with different other persons involved from each side, can then proceed outside the collaboration portal environment.

Typology 3: INFRASTRUCTURE MANAGER

Each user that is responsible for the management of an observation infrastructure available to be shared in the All-Atlantic domain can also register themselves as INFRASTRUCTURE MANAGER, in addition to the other user categories in which it is registered. As was the case for the ACTIONS MANAGER profile, also here it is important to have one single person to act as the point of contact for the interactions regarding a specific infrastructure or group of infrastructures available to be shared.

Typology 4: CRISES MANAGER

The last category of user to which the AA-MARINET collaboration portal is specifically designed should be the responsible persons for the management of crises at sea. As indicated before, these crises can assume different perspectives, from main environmental crises, to search and rescue operations or to simple

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support to observing systems affected by technical problems. The CRISES MANAGER should indicate the characteristics of the crises and the type of support required. The portal should then notify all the observation ACTIONS that can provide support to the crisis. Again, also here one single person should be indicated as the CRISES MANAGER of a particular crisis at sea in order not to disperse the interaction.

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3. Design and Implementation

The implementation of the AA-MARINET collaboration portal started in April 2021, following the signature of the Acceptance of Terms for the Implementation of the Joint Pilot Action with the title "All-Atlantic Marine Research Infrastructure Network".

The work extended through December 2022 and January 2023, from the fine-tune of the original proposed vision to the operationalization and online publication of the portal. The work was developed by a core team composed by:

- from Instituto Hidrográfico (IH, Portugal): João Vitorino (Oceanography Division), Paulo Nunes (Head of Data Centre Division), Geraldo Dias
- from AIR Centre (Portugal): José Moutinho (Co-leader of AA-MARINET JPA)
- from COPPE-Universidade Federal do Rio de Janeiro (COPPE/UFRJ, Brasil): Fábio Nascimento
- from Universidade Federal de Pernambuco (UFPE, Brasil): Moacyr Araújo
- from IFREMER (France): Florence Coroner (Co-leader of AA-MARINET JPA)

During the implementation phase, this team was reinforced with the following directly involved elements:

- From AJD3 Sistemas: João Rochate (Company CEO)
- From Instituto Hidrográfico: Ronda Branca (Head of IH-DAS), Francisco Sousa (IH-DAS), Vânia Lima (IH-DOC)

From April 2021 to September 2021, the first stage of implementation was developed. This stage included the refinement of the conceptual vision that was proposed to the seed-funding program. It also included the design of a realistic concept that could take in account the needs of the potential users, the physical IT infrastructure in which the portal was planned to operate (servers at the System Administration Service of IH) and the operational requirements.

This first stage was developed in a close dialogue with the different members of the core team indicate above. Discussions were first conducted at IH, between the different elements from this institute involved in the web portal design and implementation, to articulate the initial vision and general concept of the web portal with the requirements for implementation and operation in the IT structure of IH. In parallel, discussions with the elements from the other institutions were conducted in virtual meeting. These focused on the refinement of the initially proposed vision, with a better specification of the services available to users and of the layout of the portal. This process of discussions, particularly intensive in July and August 2021, led to a first draft of the mockups to be used in the development of the collaboration web portal. This document, reviewed during the month of September 2021 was used in the elaboration of the technical requirements to integrate the tender for contracting the service of implementation of the portal.

The launch of this tender was initially planned to occur by the end of 2021. But this date had to be delayed view the involvement of the responsible for Task 2 (João Vitorino) as responsible for the conduction of a multidisciplinary mission in Cabo Verde waters in October-November 2021, which would be a key

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component of the AA-MARINET Case Study for sharing of infrastructures (Task 3). A final version of the Technical Requirements, the key technical document to integrate the tender, was only available by the beginning of December 2021 but, by then, it was too late to start the administrative process leading to the launch of the tender still in 2021.

The administrative process aimed to contract a company to do the implementation of the collaboration portal was started in February 2022. The final version of the Technical Requirements was finalized by the end of that month and the tender was finally launched in April 2022. A total of 6 proposal were received and, after evaluation, the contract was adjudicated to the company ADJ3 Sistemas. Following the legal periods for publication of results, contest of decision and confirmation of the results, it was possible to proceed in May 2022 with the celebration of the contract with the selected company.

The work aiming the implementation of the web portal started in June 2022 with a first meeting at IH between the elements of ADJ3 Sistemas and the responsible elements from IH. The implementation work developed from June to end of December 2022. It involved a number of physical meeting, held at IH, between the different responsible persons from IH and ADJ3 Sistemas. During these meetings the structure of the portal design was fine-tuned to match the operational requirements, the characteristics of the host system were analyzed and incorporated in the implementation, the definition of the operational characteristics were settled, among other aspects.

The web portal was completed and in operation, in a first form, by the end of November 2022. During the month of December 2022 a number of tests for operational use and correction of several aspects were developed, a work that continued during January 2023.

DISSEMINATION ACTIVITIES

In parallel with the different stages of design and implementation of the AA-MARINET web portal, a number of activities were develop to publicize this portal among the broad All-Atlantic community.

These activities included a presentation of the AA-MARINET collaboration web portal on the 3 June 2021, at the AA-MARINET side session conducted during the All-Atlantic Ministerial and Stakeholder Conference 2021 (2-4 June 2021). And a participation in the side event "*Connecting Communities: Partnering on Ocean Health to Address Climate Change*" which occurred on the 14 July 2022, as part of the All-Atlantic Ocean Research Forum 2022 held 12-14 July, 2022 in Washington D.C.

In addition, on March 3 2023, the AA-MARINET collaboration portal was presented in an online session to the All-Atlantic projects and initiates with the aim to explain the portal functionalities and user profiles and ask these Atlantic projects and initiatives to register their Atlantic infrastructures available for collaborative activities in the AA-MARINET portal.

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4. Capacities Installed

The AA-MARINET collaboration web portal - https://www.aa-mari.net/collaboration-portal-general-info/, implemented under the seed funding of AANChOR Joint Pilot Actions, offers to a broad range of users an environment that was designed specifically to promote the interactions between the actors in the observation of the All-Atlantic domain. While non-registered users can access some visualization functionalities, the collaboration portal was specifically designed to support registered users, for which it offers access to a large range of tools.

As was described in section 2, the AA-MARINET collaboration portal presents to the users 3 main areas dedicated to boost articulations and development of synergies. The tools available for each area depend of the profile of the user that access to the portal. In the following subsections these tools are detailed.

AREA 1: ACTIONS

The first, and more important, of the areas implemented to boost interactions is named “ACTIONS”. This area relates to the Observation Actions in the All-Atlantic domain, both ongoing or planned to occur in the future, which way present opportunities for articulation with other observations actions also inscribed in the portal.

A number of pre-selected typologies of ACTIONS are defined in the portal. These include:

- Multidisciplinary Surveys from Ships (describing the broad range of surveys conducted onboard a research vessel or other types of vessels, namely opportunity vessels, and including observation from different types of equipment)
- Ship in transit between areas (describing the tracks of ships between observations areas, during which no specific observations were scheduled but that could be available to incorporate some type of observations)
- Glider sections (describing the tracks of gliders involved in observation programs)
- Autonomous Surface, Subsurface and Aerial Vehicles Sections (describing actions of observations of the marine environment conducted with the use of autonomous vehicles)
- Lagrangean Floats Deployments (describing actions of deployment of surface or sub-surface floats)
- Fixed Platforms and Stations (describing actions of observation using fixed platforms or coastal stations)
- Multisystem Infrastructures (describing actions of observation using infrastructures integrating different observing systems; this typology is introduced to avoid the indication of each particular

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system, the representation in the map being made through the indication of the geographical area covered by the infrastructure, the specific systems that are included being described in the specifications)

- Citizen Science Observations (indicating actions of observation conducted by the local nautical communities, schools, general public in articulation with universities or research centers)
- Other (describing other types of actions that the user considers that do not fit the one indicated in the list)

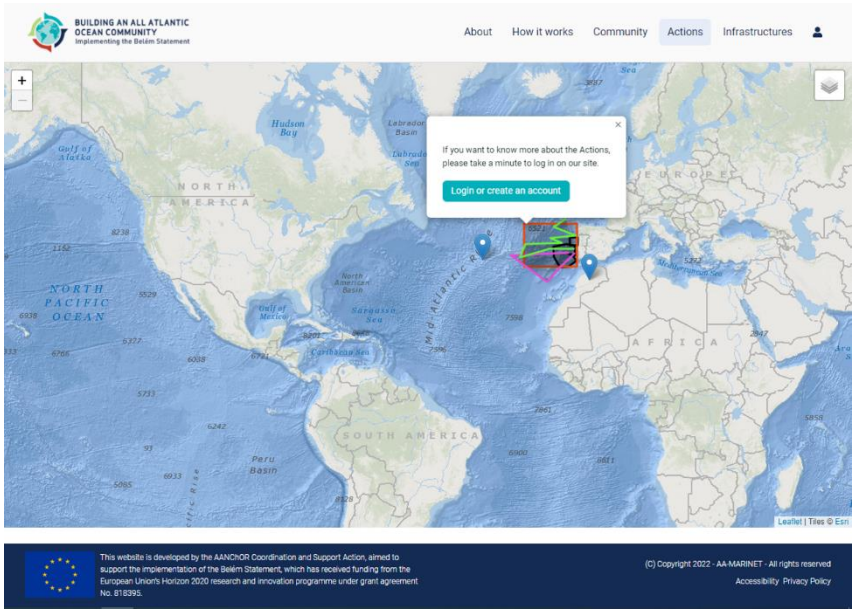

Figure 1 Visualization of Actions available to a non-registered user

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As indicated above, the access to tools that is available for the ACTIONS area depends on the characteristics of the user.

Unregistered Users.

Users that access the collaboration portal without register can only visualize the maps with ongoing ACTIONS that were inscribed in the portal for the All-Atlantic area (figure 1).

Registered Users.

Registered users can visualize the complete set of observation ACTIONS that were inscribed in the collaboration portal, both ongoing ACTIONS as well as ACTIONS planned for the future. These users can refined their visualization of the ACTIONS by selecting specific typologies of actions that they want to be displayed as well as the specific time periods of interest (figure 2).

Registered users can also indicate (during the registry process or latter) a geographical area of interest for which they would like to be notified for the existence of new ACTIONS being inscribed in the portal. When a new action is inscribed in the portal, the user receives an email notifying for its inscription.

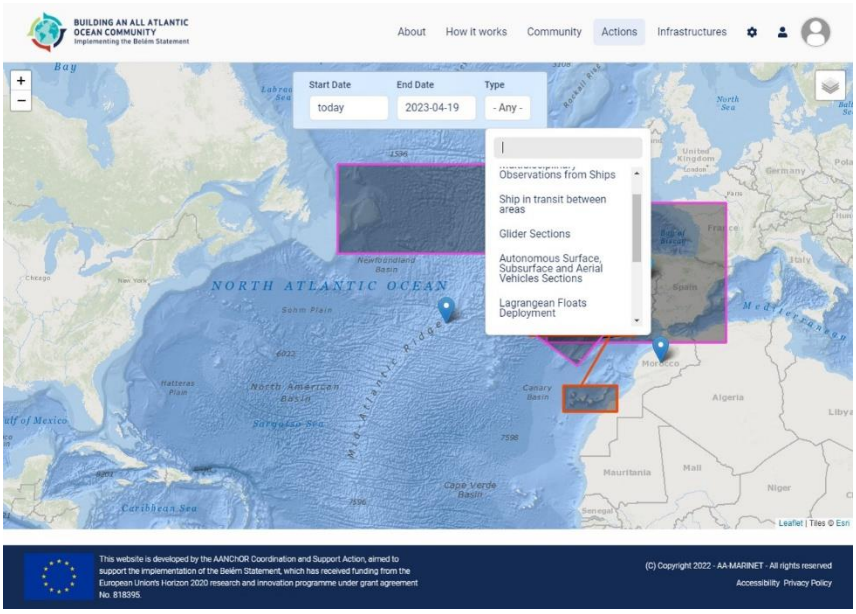

Figure 2 Visualization of Actions available to a registered user

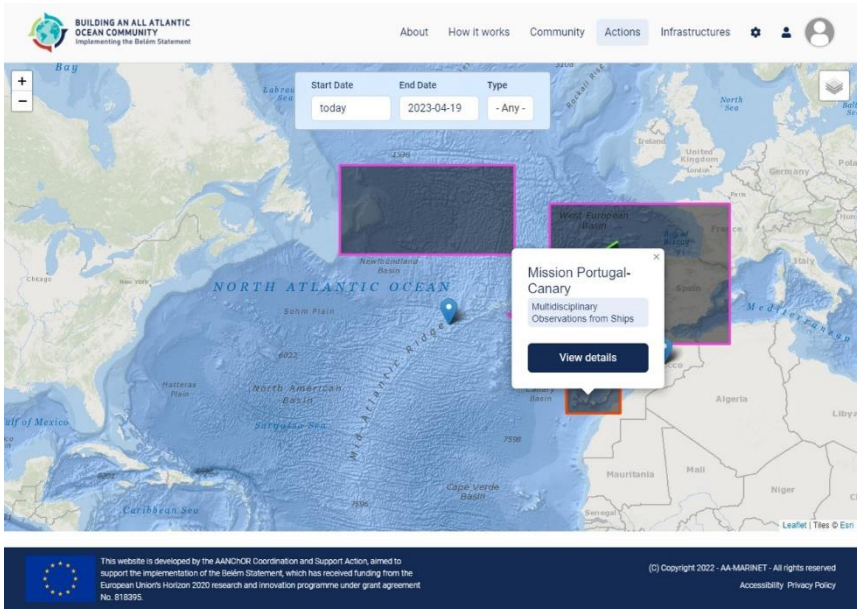

Figure 3 Visualization of Actions available to a registered user – Getting details from an observation action inscribed in the portal.

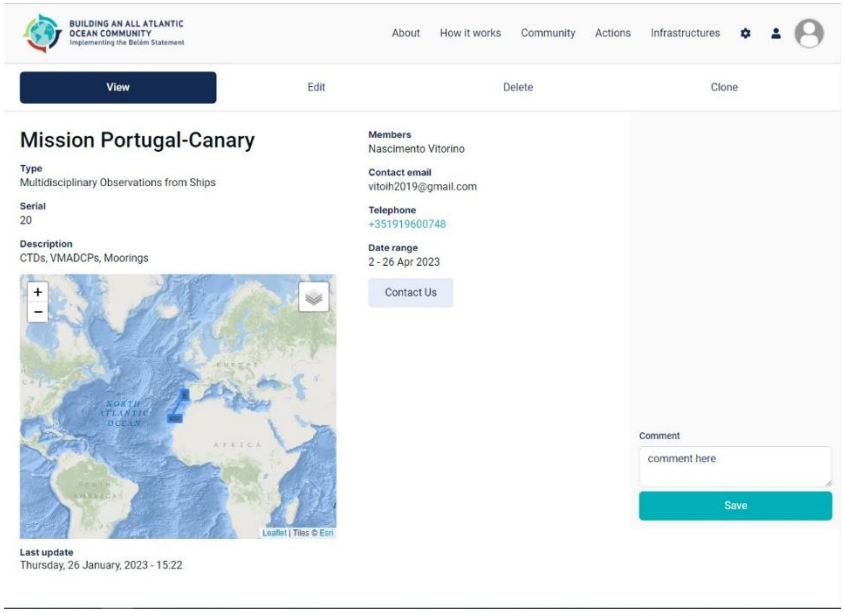

Figure 4 Information about observation action inscribed in the portal

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By clicking over one of the ACTIONS presented in the map the user can visualize the name and typology of that ACTION (figure 3). Selecting View Details the user can have access to a page containing several details about the ACTION, namely the contact details of the manager of that ACTION (figure 4). This page also contain a "Comment" area, which is not intended to support a broad interaction but also to allow the user to ask for additional details that would help him to clarify the interest of this ACTION. This functionality is implemented as a forum, so the different interactions from other different ACTION MANAGERS will remain accessible to all, promoting in this way a larger interaction.

In case a user is (or becomes) responsible for one or more Observation ACTIONS in the All-Atlantic domain, this user can register also with the ACTIONS MANAGER profile. This profile will give him access to the "My Actions" functionality (figure 5) that allows the user to insert new ACTIONS in the portal or to manage the ACTIONS he previously had inscribed (figure 6).

On the insertion of an ACTION the user is required to indicate the name of the ACTION and to indicate the geographical area were the ACTION takes place (figure 7). A GIS map allows the user to indicate the geographical locations covered by its ACTION by using a set of geometrical shapes. In this way the user can precise ACTIONS that are located in specific geographical locations (using markers to indicate these positions), actions that developed in an area (using rectangles) or actions that occur during the a transit in the Atlantic domain (using lines).

The user is also required to indicate the typology of the ACTION and the time window during which the action develops. He can indicate a permanent ACTION (in case he inscribes a permanent program of observations, such as the one associated with a monitoring infrastructure) or specify start and end dates for time limited ACTIONS (such as surveys or autonomous vehicles coverages, among others).

A following page allows the user to specify the details about the ACTION he develops or plans to develop and also the type of Collaborations and Opportunities he envisages for that ACTION (figure 8). This is information that will be accessible to other ACTIONS MANAGERS and will guide these to define if a new ACTION have the potential to articulate or collaborate with. The user then indicates the detail of the contacts of the person or persons that should be contacted for discussion of the possible articulations and collaborations. The users, being the ACTION MANAGER responsible for the ACTION, is necessarily one of these contacts. However, he may also indicate a second contact person that can be contacted when he is unavailable (e.g. onboard a ship with restricted access to communications).

In the next step, the users can also indicate if the ACTION he is inscribed is also connected, in some way, to one of the INFRASTRUCTURES he may have inscribed in the portal (see next subsection). Finally, the user is requested to enter the details about the notifications that he wants to receive from potential ACTIONS that may interact with his own ACTION. In this case he may select if he wants to received notifications from all types of ACTIONS or only from the selected typologies.

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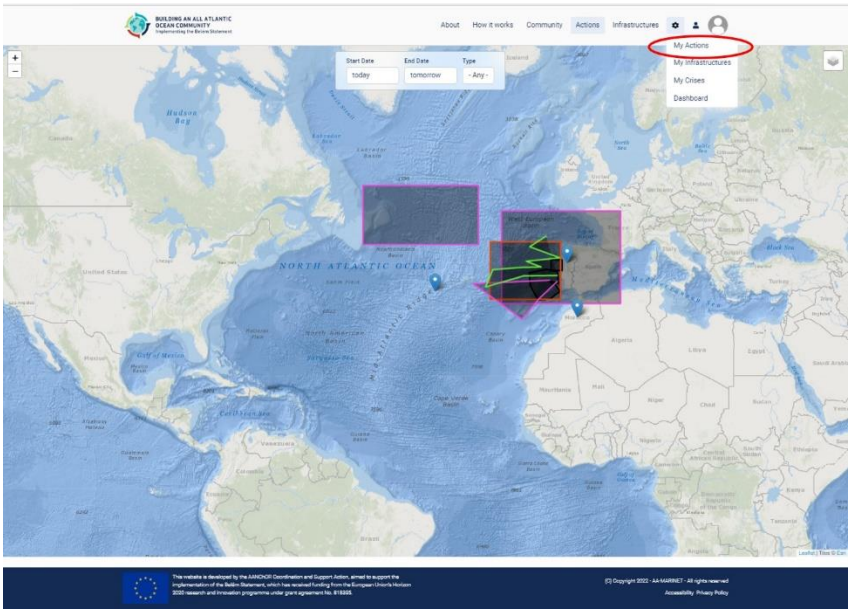

Figure 5. Insertion of new observation ACTIONS for user registered with the ACTIONS MANAGER profile

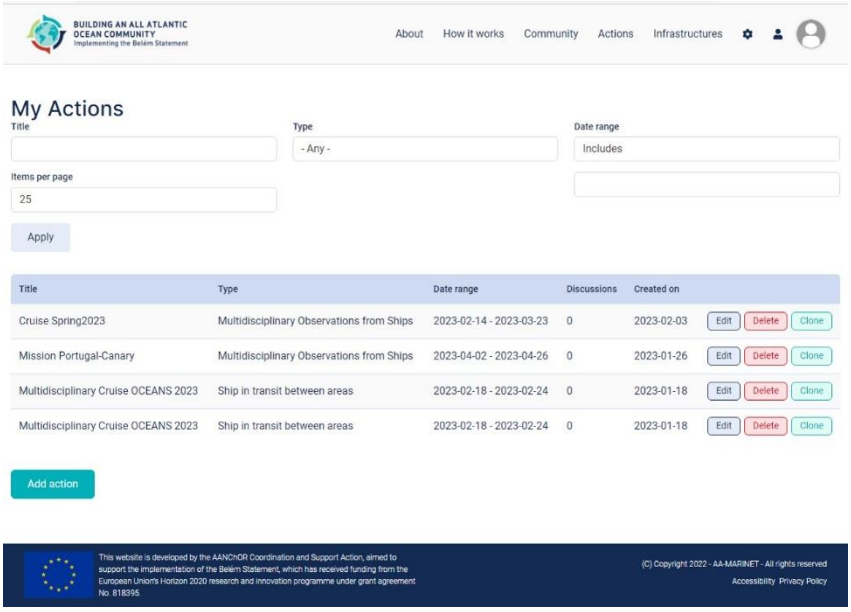

Figure 6. Management of observation ACTIONS for a user registered with the ACTIONS MANAGER profile

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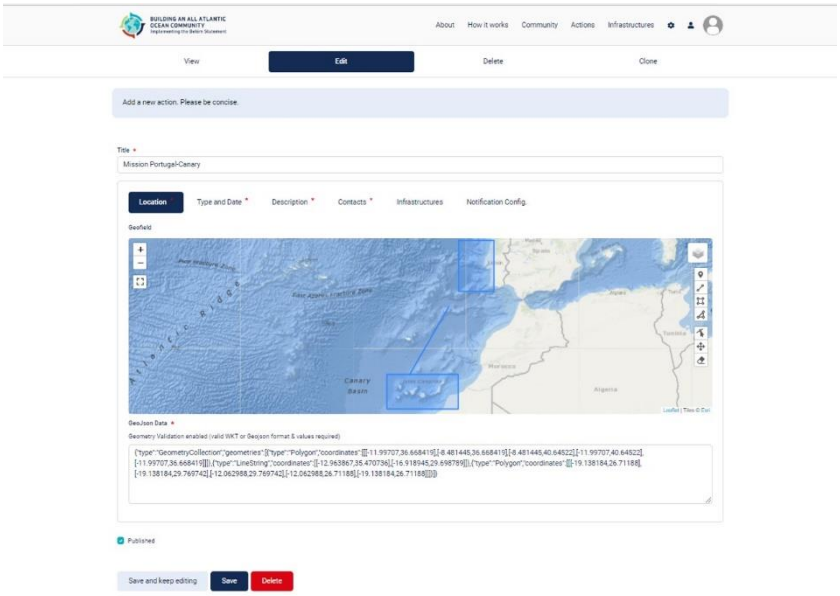

Figure 7. Specification of the geographical area were an observation ACTIONS is planned to be developed (user registered with the ACTIONS MANAGER profile)

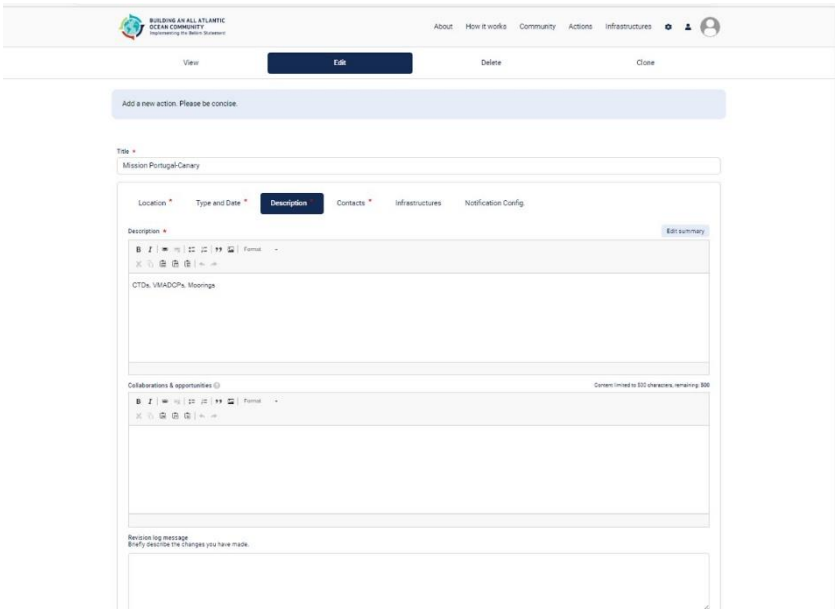

Figure 8. Specification of the details of an observation ACTIONS and information about potential collaborations (user registered with the ACTIONS MANAGER profile)

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AREA 2: INFRASTRUCTURES

The second area designed to promote interaction between users was named "INFRASTRUCTURES" and contains the tools implemented for facilitating the display and identification of the set of observation infrastructures that are available for sharing in the All-Atlantic domain. These INFRASTRUCTURES can be grouped in the following set of typologies:

- Autonomous Surface, Sub-surface and Aerial Vehicles
- Calibration Facilities
- Gliders
- Individual Sensors & Sensors Packages
- Moorings & Landers
- Onboard Laboratory Installation (e.g. Ferryboxes)
- Remotely Operated Vehicles
- Seismic and Sediment Sampling Systems
- Ships
- Manned Submersible Vehicles
- Others

Unregistered Users.

Can only visualize the maps with the overall set of INFRASTRUCTURES inscribed in the portal.

Registered Users.

All registered users can visualize the different INFRASTRUCTURES that are available for sharing (figure 9), filtering (if requested) the visualization by specifying a given time period of interest and the typology of INFRASTRUCTURES (from the list indicated above).

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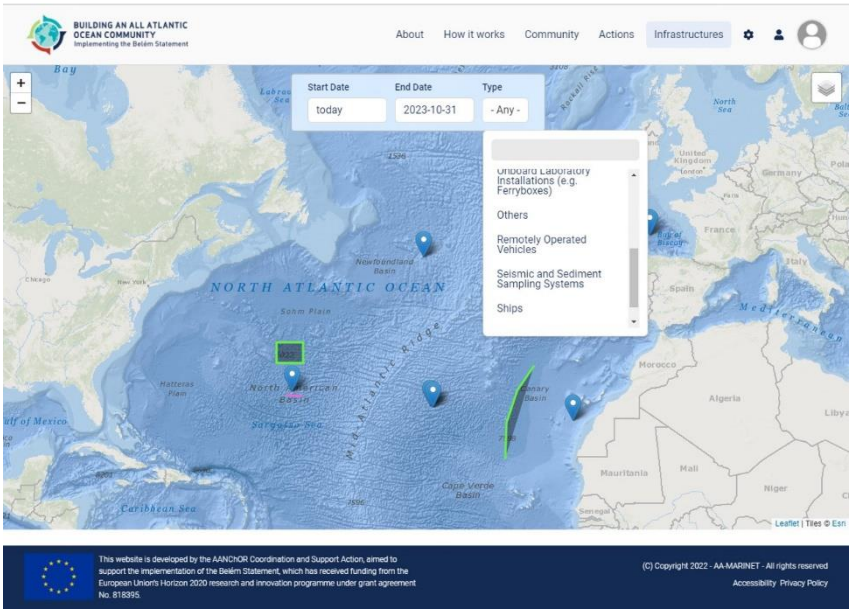

Figure 9. Visualization of available INFRASTRUCTURES for a given time period and a given selected typology (available for registered users)

Registered users can also get information about the available INFRASTRUCTURES that they identify in the map. By clicking over one of the INFRASTRUCTURES represented, a box appears with the name and typology of the INFRASTRUCTURE and a link to access to additional details (figure 10). Clicking on this link redirects the user to a page (figure 11) where several details of about the INFRASTRUCTURE and modalities of sharing are presented. This page also contains an area for comments that supports a rapid exchange of information between the user and the INFRASTRUCTURE MANAGER for that specific INFRASTRUCTURE. This area allows, for example, that the user quickly confirm some aspects related the infrastructure which are important to define the interest or not of the user in continuing the interaction (to be developed at that point by direct contact, outside the web portal). By working as a forum, this area for comments provides a view of the different interactions between different users and the INFRASTRUCTURE MANAGER, potentiating a greater level of interaction and articulation regarding the potential sharing of the INFRASTRUCTURE.

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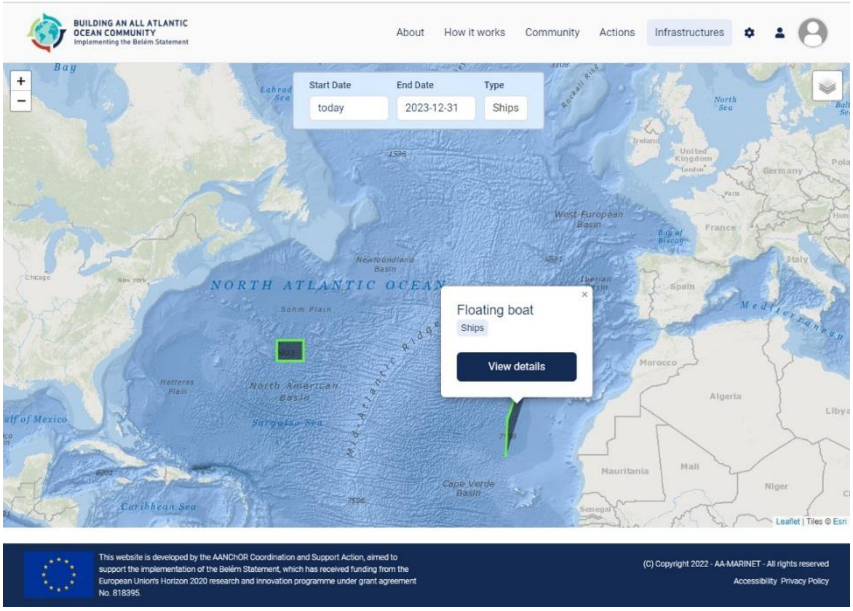

Figure 10. Getting detailed information from one of the available INFRASTRUCTURES presented in the mapping environment (registered users)

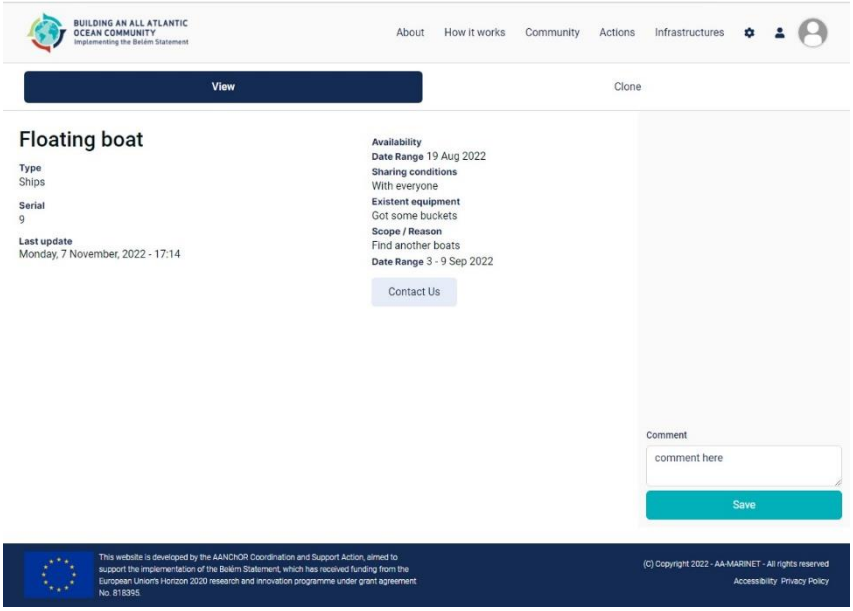

Figure 11. Detailed information from one of the available INFRASTRUCTURES presented in the mapping environment (registered users)

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Users registered with the profile of INFRASTRUCTURES MANAGERS can inscribe new infrastructures in the collaboration portal or change the attributes of the INFRASTRUCTURES they already have inscribed in the past. To access these functionalities the user should select the option “My Infrastructures” that appears under the wheel symbol of the upper panel menu (figure 12).

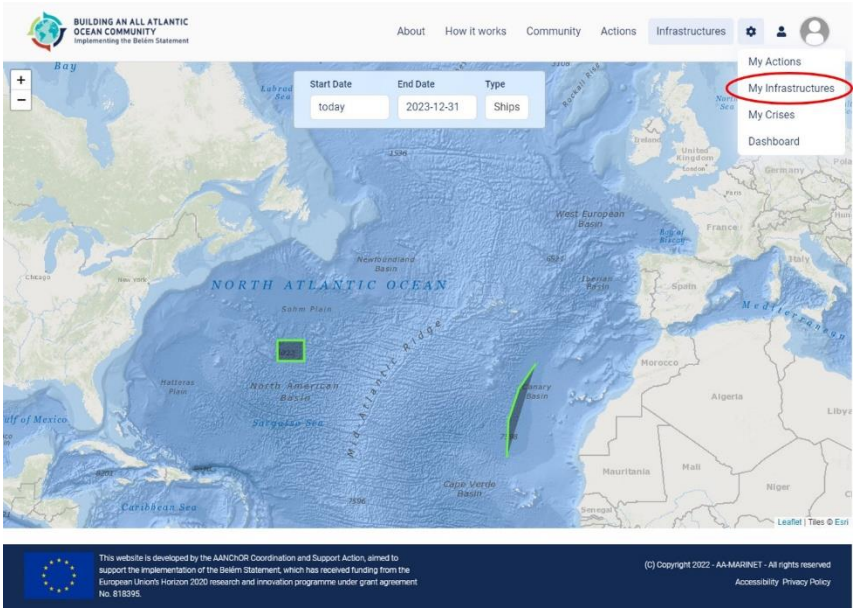

Figure 12. Inscribing new INFRASTRUCTURES or changing existent one using the My Infrastructures option (only available for users registered as INFRASTRUCTURES MANAGER)

Once this option is selected the user enters a page where it can list all the INFRASTRUCTURES available for sharing for which he is responsible and can add new infrastructures. Adding a new infrastructures is complete through the specification of the name and typology of the INFRASTRUTURE, the indication of its period of availability and geographical area where it is available (figure 13) and the description of several details about the INFRASTRUCTURE (figure 14). The inscription of the new infrastructure also requires the specification of the contacts for interaction and, optionally, of documents (unlimited number, but up to 20 Mbytes per INFRASTRUCTURE) and one image (up to 10 Mbytes) that could better describe the INFRASTRUCTURE that is available for sharing. Finally, the INFRASTRUCTURE MANAGER can also indicate observation ACTIONS inscribed in the collaboration portal that may eventually be connected with the new INFRASTRUCTURE.

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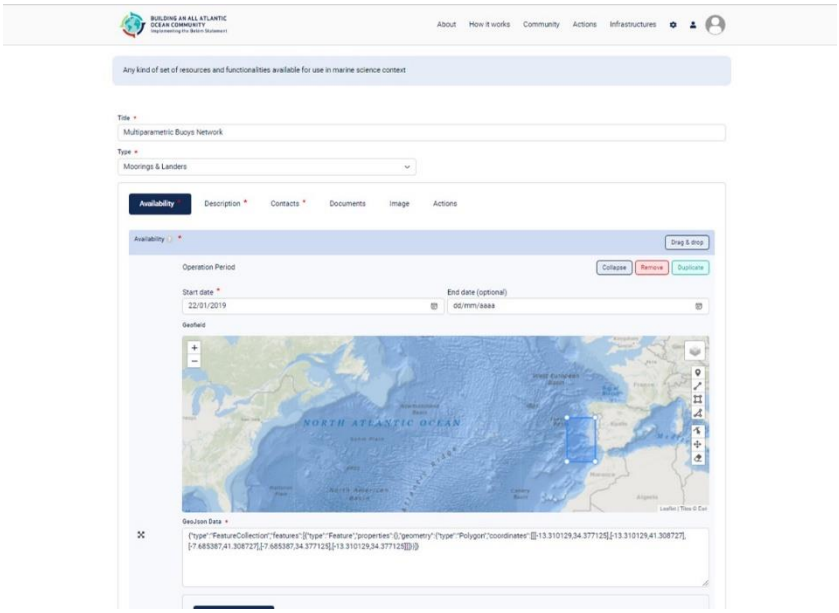

Figure 13. Inserting a new INFRASTRUCTURES, availability window for selection of geographical area were INFRASTRUCTURE is available for sharing and availability time periods (only available for users registered as INFRASTRUCTURES MANAGER)

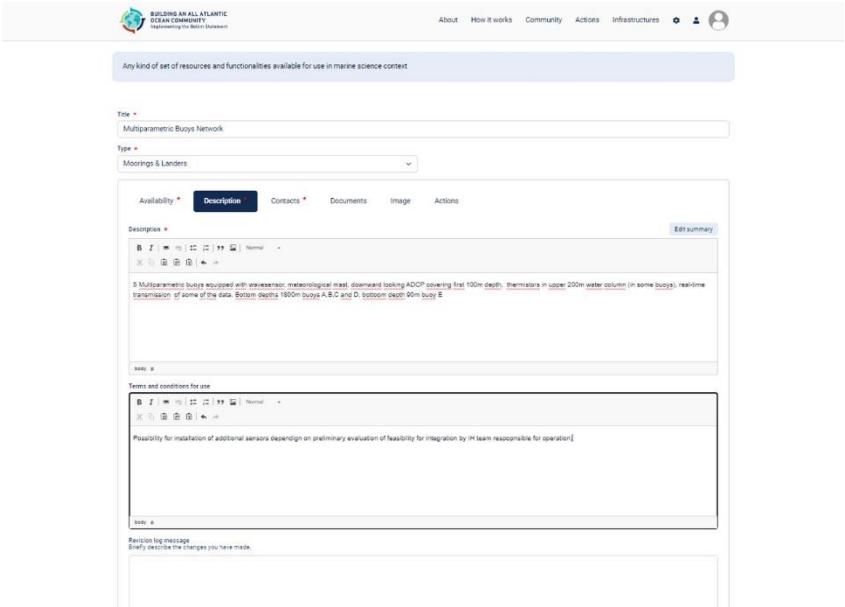

Figure 14. Inserting a new INFRASTRUCTURES: details on type of INFRASTRUTURE and modalities of sharing (only available for users registered as INFRASTRUCTURES MANAGER)

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AREA 3: COMMUNITY

The third area of interaction included in the collaboration portal is the area named "COMMUNITY" (figure 15). This area is aimed to allow a broad interaction between the different users in areas complementary, although related, to the previous areas. This area was implemented specifically to profit from the interactive environment that is offered by the collaboration portal to extend the interactions to common topics of interest such as:

- "Opportunity for Collaboration" – not necessarily restricted to collaborations associated with the development of observation actions or sharing infrastructures, but in a broader perspective.
- "Job Offer" – allowing to publicize available positions or other job opportunities
- "Looking for partnership" – in which the users can interact to find suitable partnerships for proposals or in the preparation of future observation actions, for example.

These messages can be inscribed by the user and are presented with different colors regarding the 3 different typologies described above.

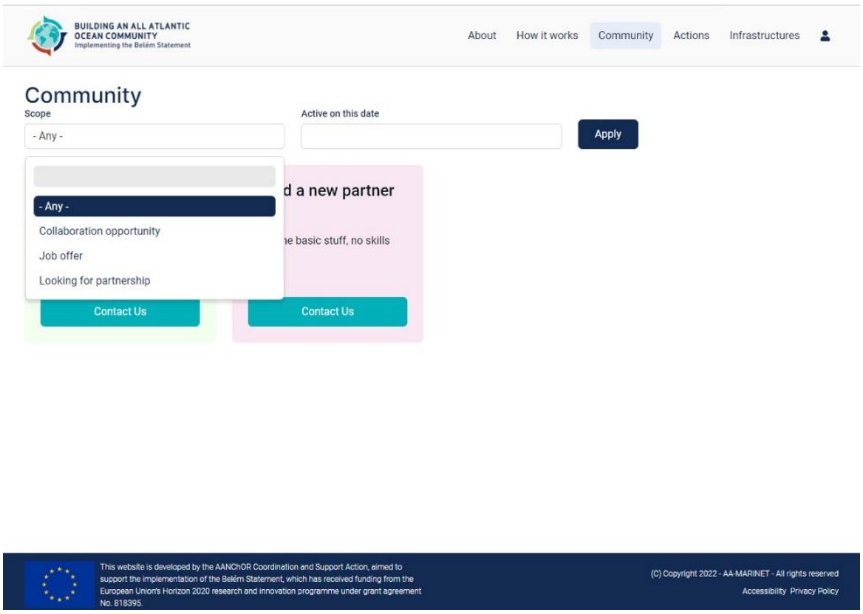

Figure 15. Inserting a new message in the COMMUNITY area (only available for registered users)

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AREA 4: CRISES

The fourth area implemented in the AA-MARINET collaboration portal to boost interaction is an area specifically dedicated to articulate the efforts of observation of the All-Atlantic marine environment in support to a crises at sea situation. Inscribing a crisis in the collaboration web portal requires that the user be also registered with the CRISIS MANAGER profile (Figure 16). This will give him access to an area where he can indicate the geographical location of the crisis, the type of crisis (from the typologies indicated below), the details about the crisis that could be more relevant to disseminate and the type of support required (figure 17).

As indicated in section 2 this area is not open to public. It was designed to allow managers of crises to indicate where a crisis is taking place, what type of crisis it is and what type of support is requested. The portal then identifies the observation ACTIONS that are being conducted in a geographical area close to the area of the crises and notifies the ACTION MANAGERS of those ACTIONS for the occurrence of the crisis and sending the contact with whom articulation of efforts can be discussed.

In most crises situations crises managers cannot disperse attention and for this reason, the CRISIS MANAGER IS NOT notified of the observation ACTIONS that are being conducted in the area close to the crisis area. In this way he is not dispersed by receiving information that can eventually lead to no articulations. Only when an ACTION MANAGER sees that it can provide support to the crisis will he establish contact with the CRISIS MANAGER.

To allow rapidly characterize a specific crisis that is developing the following categories were considered

- Oil Spills/Contaminant Crisis
- Search and Rescue
- Ships in Distress
- Drifting Hazards (containers, derelict vessels, ice, others)
- Gliders and Autonomous Vehicles in Distress
- Others

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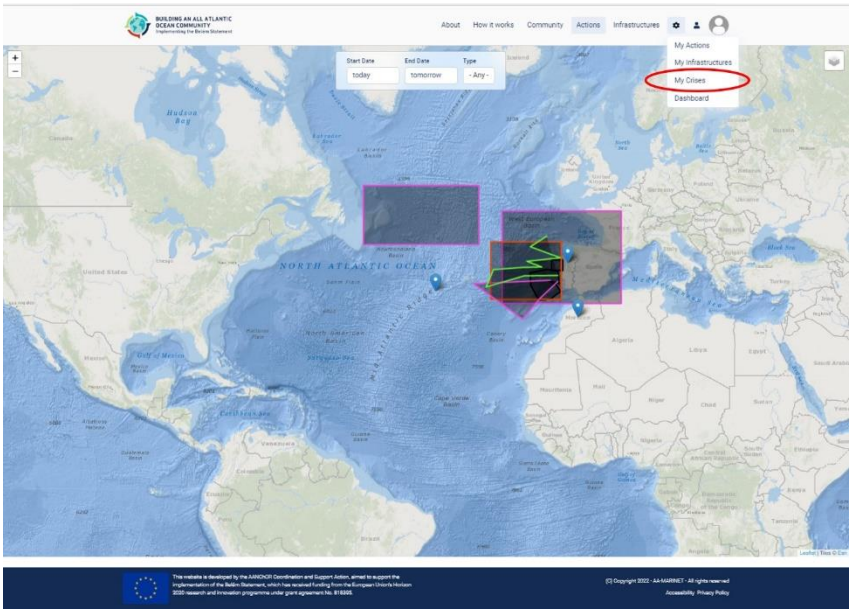

Figure 16. Inscribing new CRISES or changing existent ones using the My CRISES option (only available to users registered as CRISES MANAGER)

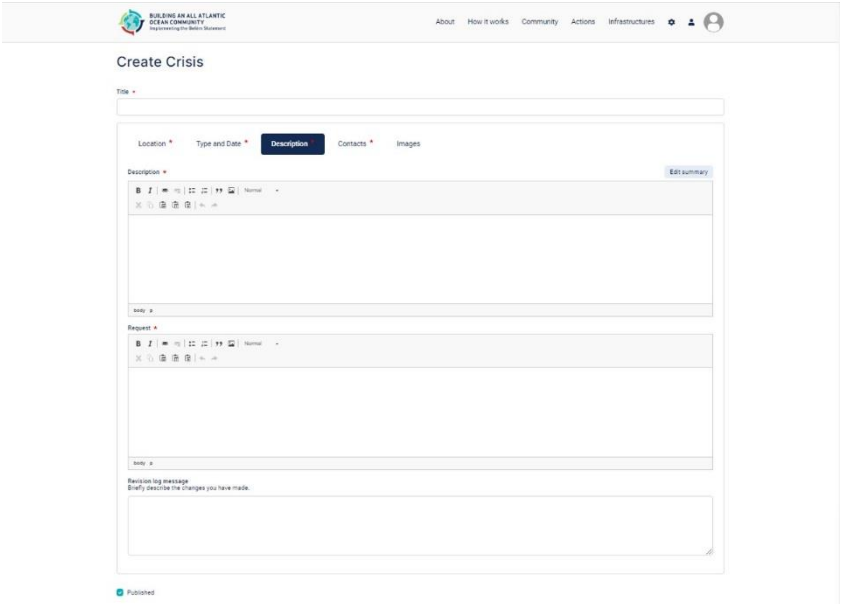

Figure 17. Description of a crisis and type of support requested in the My CRISES option (only available to users registered as CRISES MANAGER)

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5. Future Developments

The AA-MARINET collaboration portal was built as a relatively light structure that allows a relatively low-cost management and operation. This can allow and ease the day-to-day operation and the management of interaction with the communities. The feedback of the different users that engage in this portal is determinant to improve it and to expand capacities if needed. This phase of evaluation of the portal was not able to be fully developed during the period of the seed funding, due to more extended period required for the implementation, but is planned to be achieved during the following operational phase of the portal.

The AA-MARINET web portal was implemented taking the perspective of articulation of observation infrastructures in the All-Atlantic domain. This means that the inscription of new actions or infrastructures (or crises) is restricted to an area around the Atlantic basin. This relates with the physical articulation perspective, in which observation actions are incentivized to articulate in a close geographical domain of where they are developing. But this perspective may change in the future if the articulation evolves to the perspective of joint efforts to understand and maps the all ocean domain. In this case, the articulation could also contemplate synergies between observations that are developed (e.g. in similar time periods) in different oceanic basis (e.g. in the Atlantic and in the Pacific). The structure of the web portal allows this transition to the broader domain without any kind of effort of adjustment required.

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AA-MARINET Contact Details

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Facebook**: @AllAtlanticOcean**

YouTube: **All-Atlantic Ocean Research Alliance**

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