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1 Executive summary

From 2009 to 2017, the EUROFLEETS 1 and 2 projects have been the cornerstone of European Research Vessel Fleet cooperation. Their success across diversified thematic areas has been significant, successfully implementing and testing solutions for broad European cooperation in areas such as:

- Providing European researchers with access to cruises on board high performing research vessels (RVs) flying various national flags, on the basis of scientific excellence in addition to promoting innovative e-access to RVs during scientific cruises,
- Updating a consolidated view of the European RV fleets, thus building a European shared strategic vision of the foreseeable evolution of this infrastructure,
- Fostering coordinated and development of European RV fleets, thanks to new interoperable software and innovative underwater vehicle payloads, thus enabling better structuring and coordination of fleets through a relevant information platform such as EVIOR,
- Developing training and education at sea with young scientists and/or technicians,
- Promoting greener and more sustainable RV and underwater vehicle operations and design.

The Transnational Access (TA) Programme has been an incredible success, allowing the scheduling of about twenty campaigns during each project, for the benefit of more than 200 (EUROFLEETS 1), then almost 500 (EUROFLEETS 2) European and international researchers and students. Although TA has involved a limited percentage of European marine researchers, it has proven itself to be vital for a significant number of countries who otherwise would not have the necessary means to access research vessels. The scientific requirement is now a reference, and the EUROFLEETS projects have made it possible to strengthen European cooperation by bringing on board scientific teams of several nationalities.

EUROFLEETS1 and 2 Networking Activities contributed to an impressive sharing of knowledge, best practices and expertise. They have significantly consolidated the links between European RV operators. The developments made in collaboration have shown how the association of the R&D forces of various European teams can be fruitful and open the way to technological innovations, and shared software tools vital for European marine research. Education and Training programmers developed in EUROFLEETS1 and 2 are now a reference programme at European level for at-sea training.

The major risk, at the end of the EUROFLEETS project series is the disappearance of fruitful scientific cooperation through TA, especially for non-equipped countries that are not capable of providing the necessary at sea facilities to its national teams. There is a real possibility that when the EUROFLEETS project series comes to an end the development and structuring of a national infrastructures and/or the establishment of a sustainable system for European cooperation will not have been carried out in time to take over the “relay baton” in order to maintain and develop further TA for RVs and associated scientific equipment and instruments. It is also clear that if no follow up of the EUROFLEETS Networking Activities is set up from 2024, it will mean the loss of a space of cooperation, of mutual knowledge exchange and of capacity to build together a European arena for marine research cooperation, which will disappear.

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Faced with this observation, and based on the detailed SWOT reported in Chapter 3, the members of WP8 worked on the definition of scenarios for a future platform for the coordination of European fleets (hereafter EUROFLEETS RI), which would take the form of a Research Infrastructure with legal existence. From a methodological point of view, we relied on a methodology provided by the University of Milan Bicocca (UNIMIB). We have therefore worked to identify the values that we share, the vision that we have of this future infrastructure, as well as the missions that it could carry out (Chapter 4).

The result of this work, which is currently being pursued through the definition of a business model, is a strong dynamic shared by all the operators and institutions present in WP8, and a reaffirmed willingness to propose sustainable and ambitious solutions to amplify European cooperation in the field of research fleets, beyond the EUROFLEETS 1 and 2 projects, then EUROFLEETS+.

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2 Introduction

Over the course of 8 years, the EUROFLEETS1 (2009-2013) and EUROFLEETS2 (2013-2017) projects succeeded in several fields in participating to the European efforts to stay 'at the highest level of international scientific competition'

By establishing one of the first pan-European evaluation systems for ship-time proposals and by providing access to numerous European Research Vessels (RVs) to European scientists and their partners on the basis of scientific excellence through a real and fair competition, EUROFLEETS has attracted European and international scientists.

By promoting the sharing of available infrastructures and equipment, both EUROFLEETS projects have created synergies between member states to enhance experience and capabilities and in particular supported scientists from less or non-equipped countries to access RVs and thereby improve their experience in marine research. Both projects have been the cornerstone of the advancement of European cooperation of marine research fleets over those 8 years, with a strong desire to open the fleets up to scientific teams from all European countries, and beyond including those that do not have significant marine research infrastructures themselves. These projects have introduced an unprecedented dynamic to date, but like all projects, they have an end, even if the EUROFLEETS+ project, which succeeded them, has allowed the continuation of the work done before and, through its WP8, will propose solutions to perpetuate this dynamic beyond 2023.

Within the framework of WP8, a mapping of the major pioneering innovations introduced by the two previous EUROFLEETS projects has been drawn up and a SWOT analysis has been carried out. By doing this, the objective is to clearly identify what must be at the heart of a sustainable system to maintain and continue to develop a pan-European cooperation with regards to research vessels and associated scientific equipment and instruments, but also to put in place solutions that endeavor to address the weaknesses that have been addressed in Chapter 3 of this deliverable.

In Chapter 4, we present the work conducted by the WP8 beneficiaries (see list of participants in Annex 1) who have met regularly since 2019, face-to-face and remotely during the active phases of the Covid-19 pandemic. The group has developed a shared vision of a sustainable European fleet coordination system (EUROFLEETS RI), its values (beliefs) and its missions, taking into account in particular the conclusions drawn from the analysis of Chapter 3.

This work is continuing with the development of a business model for a coordination system, taking into account the work already considered, analyzed and documented in Deliverable 8.1 on the different legal structures that such a system could take. The proposed business model(s) shall be presented in Deliverable 8.3 scheduled for the end of January 2022.

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3 The EUROFLEETS heritage

The EUROFLEETS1 and 2 projects produced a very large number of reports, guidelines, etc. An exhaustive list of these documents is given in Annex 2, and was used as a basis for the analysis conducted below. Based on all these documents, we have identified 5 main thematics that we used to conduct an impact assessment:

- Providing European researchers and their partners with access to cruises on board high performing research vessels (RVs) flying various national flags, on the basis of scientific excellence in addition to promoting innovative e-access to RVs during scientific cruises,
- Updating a consolidated view of the European RV fleets, thus building a European shared strategic vision of the foreseeable evolution of this infrastructure,
- Fostering coordinated and development of European RV fleets, thanks to new interoperable software and innovative underwater vehicle payloads. enable better structuring and coordination of fleets through a relevant information platform such as EVIOR,
- Developing training and education at sea with young scientists and/or technicians,
- Promoting greener and more sustainable RV and underwater vehicle operations and design.

3.1. Providing European researchers and their partners with access to cruises on board high performing RVs flying various national flags, on the basis of scientific excellence in addition to promoting innovative e-access to RVs during scientific cruises

During EUROFLEETS1, 54 proposals for ship-time on Global/Ocean and Regional RVs were submitted in three different calls, and 17 cruises were carried out amounting in a total of 190 days at sea, with a clear focus on the North Atlantic and the European regional seas, in particular the Mediterranean Sea. The scientific disciplines carried out on these cruises covered all fields of marine research with a focus on geosciences. In total 221 scientists and students participated in the EUROFLEETS1 cruises. The Principal Investigators (PIs) of the cruises came from all over Europe and international collaborators from US, Canada, New Zealand etc. have been involved. Additionally, the applications for the "Regional2" call contained more proposals from new European Union member states or other countries than the proposals for the "Regional1" call, showing that the call for proposals reached a larger audience and the guidance given for the applications also helped scientists from new member states to successfully apply for ship-time.

The Trans-national Access (TA) organized within EUROFLEETS1 convened joint scientific cruises and contributed to the scientific exchange in Europe by fostering multi-disciplinary and multi-national groups to apply for the cruises, and by allowing funded access to scientists on RVs they have no or limited access to. A collaborative cruise was also organized on board the French RV *L'Atalante* with two scientific parties from two different disciplines namely of geology and biology using a two-step process involving two successive calls for ship time. A multi-team and multi-disciplinary cruise in this form has an innovative character opening up new avenues for the future.

During EUROFLEETS2, TA as a core activity of the Project aimed to open free of charge access to 22 European RVs and five pieces of equipment based on scientific excellence. Five pan-European calls were organized to this purpose: three "Regional" calls targeting specific geographic areas, one innovative "Super-Integration" (multi-platforms) call aiming to identify one flagship proposal requesting one or several RVs in combination with other infrastructures, and one original "Embarked

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Equipment" call aiming to deploy underwater equipment during nationally funded cruises, so fostering inter-operability within European RV fleets. The scientific excellence of submitted proposals was evaluated according to the European and independent evaluation process successfully developed within EUROFLEETS1.

EUROFLEETS2 provided 498 European researchers and their partners (33 countries in all, 33% as remote users) with access to 24 cruises on board 17 RVs flying 13 different national flags, available in European seas in addition to the Arctic and Antarctic polar and sub-polar areas. They represented a total of 211 ship, and 24 equipment fully funded days at sea. Based on the EUROFLEETS1 experience, the flagship "Super-integration" cruises demonstrated how multi-platform experiments generate and develop synergies with other initiatives or projects at both European and national levels.

The funding rate (48%) was higher than in the EUROFLEETS1 project, mainly due to the launching of ship-time calls in targeted geographical areas which allowed for better synchronisation between working areas requested in proposals and availability of RVs in the regions. 6 cruises were carried out in polar and sub-polar areas. The Mediterranean Sea received the greatest demand from the academic community with a total of 10 cruises carried out in the region.

Moreover, through the provision of feedback from the proposal evaluation to non-selected PIs, EUROFLEETS 1 enabled applications to progress towards excellence, and to achieve success in the following ship-time calls and access funded cruises in EUROFLEETS2.

During EUROFLEETS2, the quality of proposals submitted to the "Ocean" call differed considerably from those of the "Regional1" call, primarily reflecting a different user profile and experience level in the writing of proposals. A successful involvement of proponents with less experience benefited from a more detailed proposal structure description and several templates completed and distributed for the "Regional2" call. This led to higher and more uniform standards for proposals across Europe. As part of the review process the Scientific Review Panel (SRP) prepared a detailed Evaluation Summary Report to provide applicants with a comprehensive feedback on their proposal, indicating strengths and weaknesses for each section of their proposals. For some of the proposals on Regional RVs the SRP recommended a resubmission of an improved version of the proposals to the "Regional2" call. This provided potential applicants with the opportunity to improve the quality of proposals for ship-time. These measures of guidance and support in proposal writing would profit most from a continued process of calls on a pan-European level, thereby raising the international competitiveness of European marine scientists.

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Strength

The EUROFLEETS1 and 2 projects were excellent demonstrators of the European Commission (EC) funding leverage effect for TA to reinforce the position and visibility of European marine sciences which as a whole are really competitive with the United States of America and Japan ones.

The two-step evaluation system developed and implemented by EUROFLEETS, in which proposals with only a scientifically ranking of excellence are considered for logistical evaluation, ensures only the top proposals are considered for funding. The system has proven to be efficient and transparent. Its criteria have been used for future evaluation of European ship-time calls. This legacy has been successfully demonstrated with the implementation of the Eurofleets Evaluation System for the Arctic Research Icebreaker (ARICE) project for the evaluation of proposals submitted in its TA activity.

The leverage effect of the European funding has been demonstrated through additional days at sea during EUROFLEETS2 cruises funded by the ship or equipment operators, through training courses run on board RVs funded or co-funded by Project beneficiaries, or through numerous tests run for developed software or underwater payloads with only marginal costs charged to the Project.

The Super-Integration cruises have shown an innovative way of integrating European and international infrastructures, demonstrating how multi-platform experiments involving RVs together with other landbased infrastructures can develop synergies with other initiatives or projects at European and national levels

The TA to European RVs and marine equipment developed in EUROFLEETS2 has reinforced the EUROFLEETS1 model for easier access to RVs, embarked equipment and services at sea on the basis of scientific excellence, for all European scientists and their partners. It has also created a unique opportunity for early career scientists and for scientists from nations with limited or no access to RVs.

Weaknesses

The main weaknesses identified are (1) the relatively limited impact in volume of this TA scheme on the European marine science research community, and (2) the lack of sustainability of the TA scheme.

The impact is limited in volume because of the budgets to be mobilized for the campaigns. As an example, a one-month campaign on a Global Class vessel including underwater vehicles has an estimated cost of 2 M€, while a 15 day campaign on a Regional Class vessel represents a budget of between 200 to 300 K€, depending on the vessel and/or the equipment mobilized. Consequently, it is impossible to finance a large number of campaigns without significant budgetary support. Even when EUROFLEETS2 reached 500 scientists, it probably reached only 5% of the entire European marine research community. However, access through TA scheme remains crucial for some countries with limited or no facilities,.

The lack of sustainability is therefore critical. It is directly linked to the nature of EUROFLEETS1, EUROFLEETS2 and EUROFLEETS+, as projects with a defined beginning and end, and only financed by a budget allocated by the European Commission. The lack of national funding and a legal structure therefore makes it impossible to continue this TA system once the EUROFLEETS+ project ends.

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Opportunities
TA type of European call system can be leveraged to international cooperation. That could be a requisite for proposals submitted to a European System. Based on the experience in EUROFLEETS2, where only two different nationalities were requested to compose the scientific team, it is considered that this rule must be strengthened and a requirement of a minimum of three different nationalities must be guaranteed to emphasize the spirit of international cooperation and open opportunities to newcomers. Thanks to the higher number of remote users (representing 33% of the scientific parties involved in the TA cruises) than in EUROFLEETS1, EUROFLEETS2 has optimized the use of funded ship-time and enlarged the Project's audience within the European and international scientific community. The TNA of EUROFLEETS 1, E2 and E+ is an excellent way to make the European marine science research community visible, as participation in these campaigns often has been an opportunity to highlight various laboratories and their activities thanks to the very effective implementation of its communication strategy. These projects actively participate in the necessary "marketing" to make visible and demonstrate the need for European marine research at the international level, but also the contribution of national teams in regional projects for all European countries.

Threats
The major risk, at the end of the EUROFLEETS project series is the disappearance of fruitful scientific cooperation for countries through TA that are not capable of providing the necessary at sea facilities to its national teams on their own. The success of the EUROFLEETS projects may lead to a lack of national political commitment for the acquisition or development of national RVs and/or scientific instruments and equipment. There is a real risk that when the EUROFLEETS project series comes to an end the development and structuring of a national infrastructures and/or the establishment of a sustainable system for European cooperation will not have been carried out in time to take over the "relay baton" in order to maintain and develop further the TA for RVs and associated scientific equipment and instruments.

3.2. Updating a consolidated view of the European RV fleets, thus building a European shared strategic vision of the foreseeable evolution of this infrastructure

By bringing together RV fleet operators the EUROFLEETS projects have significantly consolidated the links between European RV operators and owners.

Through an intensified collaboration and sharing of information, and thanks to the participation of OFEG (Ocean Facilities Exchange Group) and ERVO (European Research Vessel Operators) in the EUROFLEETS Fleet Evolution Group, EUROFLEETS1 made a new step towards a coordinated strategic vision of European RV fleet. The Project developed a comprehensive picture of the European RV fleets and provided a "forecast" of the required future capabilities and capacities in Europe regarding Global, Ocean and Regional class RVs, associated scientific equipment and instruments.

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To improve efficiency and flexibility in the management of the European RVs and to promote the coordinated development of operating procedures and standardized protocols for RV operators EUROFLEETS1 focused on three areas in order to:

- Establish a useful database on technical requirements and mobilization of European LEXIs (Large EXchangeable Instruments) in addition to establish criteria for standard interfaces/footprints ensuring future interoperability between vessels, sensors and payloads;
- Describe the variety of national methods to access Regional Research Vessels (RRVs), as an essential prerequisite for the development of a common cruise scheduling system within EUROFLEETS2.

Recognized as the appropriate forum for information sharing on strategic views of European RV operators, the EUROFLEETS Fleet Evolution Group (FEG) created in EUROFLEETS1 was continued and extended in EUROFLEETS2 in the frame of the "Strategic vision of European research fleets and international coordination" work package. The FEG gathered all ship operators involved in the Project and allowed to follow-up the status of European RVs and their foreseeable evolution, in collaboration with the OFEG and ERVO groups which were invited as permanent invitees to the EUROFLEETS2 General Assemblies.

Following the development of the inventory of European RVs and renewal plans established in EUROFLEETS1, in 2016 EUROFLEETS2 launched a new and more complete survey, aiming to update the list of European RVs established in 2013 and also to identify their geographical areas of operation, their types of activities and to give an overview of technical capacities available on board. While the EUROFLEETS1 survey focused on Global, Ocean and Regional class RVs, the EUROFLEETS2 survey was extended to RVs of the Coastal classes, with the aim to determine which of the Coastal RVs, classified in an intermediate class "Coastal/Regional (CR) RVs", have the ability to sail within their basin of operation to possibly be involved in cooperation programmes.

The WP analysed schemes for future collaboration that progressively evolved with respect to complexity and involvement, with proposed schemes ranging from implementing annual meetings dedicated to mutual information on national cruise schedules among countries operating RVs and equipment within the same geographical area, to a more formalized establishment of dedicated regional fleets. The WP also suggested to developing a "Virtual Fleet" concept which is defined as a group of RVs and/or embarked equipment, to which a funding scheme and shared assessment organization of research projects gives access.

Strength
The EUROFLEETS1 and 2 Networking Activity contributed to an impressive sharing of knowledge, best practices and expertise, and EUROFLEETS projects have significantly consolidated the links between European RV operators. EUROFLEETS2 has paved the road towards an increased and cost-effective Regional RV integration through keystone initiatives. The idea of stimulating regional cooperation through an increased level of communication (e.g. structured annual meetings among ship operators), is a basic but pragmatic approach allowing to foster future bi-national or multinational collaborations. The work of the FEG continued beyond the EUROFLEETS2 project, as its main actors took part in the development of the European Marine Board Position paper #25 "Next generation European Research Vessels - Current status and foreseeable evolution" which was published in November 2019.

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Weaknesses
EUROFLEETS2 highlighted possible difficulties that may arise when moving to a genuine distributed research infrastructure. This is mainly due to e.g. the highly varied ownership, organization and funding schemes of the current RV fleets across Europe. A European distributed research infrastructure concept, as recognised by ESFRI and comprising several Regional RVs has also been proposed by EUROFLEETS2 with limited success.

Opportunities
The EUROFLEETS2 consortium proposed the set-up of a formal "European Fleet Infrastructure Coordination System", on time-scales that extend beyond those of the EUROFLEETS projects, will accommodate and nurture long-term coordination activities, encourage knowledge sharing, catalyze the emergence of joint projects, and overall promote the European marine RV fleets on the international scene. The EUROFLEETS projects series will probably have ended in 2024. This perspective should be used as a lever to mobilize decision-makers in the various European countries to move towards a system of coordination of the activities of national fleets, as part of the construction of a real European marine research area, for the benefit of all its scientific stakeholders.

Threats
If no relay of the EUROFLEETS Networking Activities is set up from 2024, it will mean the loss of a space of cooperation, of mutual knowledge exchange and of capacity to build together a European arena for marine research cooperation, which will disappear.

3.3. Fostering coordinated and joint development of European RV fleets, thanks to new interoperable software and innovative underwater vehicle payloads, thus enabling better structuring and coordination of fleets through a relevant information platform such as EVIOR.

3.3.1 NEW INTEROPERABLE SOFTWARE AND INNOVATIVE UNDERWATER SYSTEM PAYLOADS.

During EUROFLEETS1 the Joint Research Activity (JRA) focused on the development of four software prototypes:

- EARS (EUROFLEETS Automatic Reporting System) for recording events occurring during a cruise.
- GLOBE software (Global Oceanographic Bathymetry Explorer) mainly dedicated to MBES (Multi Beam Echo Sounder) data processing. GLOBE produces Digital Terrain Models (DTM) compliant with the EmodNET methodology, allowing the proposal of the GLOBE software as a reference tool for the provision of DTM products to the EmodNET2 community.
- CDInfusion for the integration of molecular data with oceanographic data from various cruises.
- The Deep Sea Video Platform for the visualization and annotation of video from ROV surveys.

Special attention was also paid to the calibration of multi-parametric probes, as this is an essential issue for both the data logging and the delivery of high-quality raw data to the scientific community.

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The second area of work of the JRA aimed to develop a set of three interoperable payloads for underwater systems; the BioGeoChemical (BGC) module, the 3D HDTV camera and the In Situ Chemical Analysis and Sampling Payload (ICASP) module.

EUROFLEETS2 has reinforced the EUROFLEETS1 activities to harmonize and standardize the workflow from onboard data acquisition to onshore storage by datacentres, seeking synergy with existing international and European initiatives. EUROFLEETS2 focused on several axes, with i) the development of 3D reconstruction methods adapted to different vehicle hardware in off line processing tools, ii) the development of onboard mapping integration for reactive and task driven mission execution and iii) the evaluation and qualification for new battery technology, common approaches for procedures and safety management.

The JRA of EUROFLEETS2 focused on the development of four different softwares:

- EARS V2 (the development of the EUROFLEETS Automatic Reporting System) for recording events occurring during a cruise, adding ontology to decentralize vocabulary of events and standardize storage and management. The EARS2 software should allow making a step on top of the structure that comes from SeaDataNet, being able to extend it according to the particular needs of each cruise, speeding up and simplifying the creation of events.
- The Data Acquisition System, to standardize the data obtained by the acquisition process.
- An en-route Ship Summary Report (SSR) for the en-route data transmission from vessel to shore.
- Web services to link EARS with the Data Acquisition System and en-route SSR.

Efforts were also made to have the possibility to have remote access to the acquired data in real time or almost in real time.

3.3.2 STRUCTURING AND DURABLY COORDINATING, THROUGH THE E-PLATFORM EVIOR, THE WAY THAT THE RESEARCH VESSELS ARE OPERATED

During EUROFLEETS1, in order to improve information sharing and provide up-to-date information about European RVs, cruise programs, completed cruises and specialized marine equipment, the EUROFLEETS1 project through its WP package “Virtual Research fleet platform” developed the European Virtual Infrastructure in Ocean Research (EVIOR) by way of an Integrated Information Portal with an aim to enhance awareness of opportunities among users and to improve cost-effectiveness of cruises. For the Cruise Program information, the British Oceanographic Data Center (BODC) was contacting operators and gathering input, while MARiene Informatie Service BV (MARIS) ensured that new inputs are well imported. The Cruise Summary Report (CSR) was maintained in cooperation with the SeaDataNet network, while the information on RVs and LEXIs were maintained by EurOcean. In May 2013, prototype functionality for Dynamic Vessel Tracking & Events was added to EVIOR, as a first step towards a common system for giving e-access to underway and operational information and data from sailing RVs.

The EUROFLEETS2 project continued the development of the EVIOR electronic platform, with implementation of the “Scheduling tool” prototype, which was developed in EUROFLEETS2. Through interactive schedules, the tool provides direct access to information on scheduled cruises, RVs and embarked equipment. The upgrade of the EVIOR platform is aiming to provide up-to-date information on planned, ongoing and completed cruises, on the RV fleets and associated large equipment (LEXI), and to promote interoperability by deploying the EARS software for logging of data and metadata.

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Strength
The development of tools for centralized on-board banking or processing of acquired data, harmonization and standardization of the workflow from on-board data acquisition to onshore storage by datacenters meets a vital need, which EUROFLEETS1 and 2 have addressed. Such software guarantees availability and efficient processing of the data acquired to the scientific teams. The sharing and dissemination of knowledge previously held by isolated technological teams, has allowed the development of payloads or common expertise around underwater systems. This work has founded the basis for further direct collaborations between the teams, or in other European projects such as EU Marine Robots. The European Virtual Infrastructure in Ocean Research (EVIOR) portal build for providing up-to-date information about European RVs, cruise schedules, completed cruises and specialized marine equipment, will enhance awareness of opportunities among users and improved cruise cost-effectiveness. Created in cooperation with existing initiatives such as SeaDataNet and POGO, EVIOR includes the Cruise Summary Report (CSR) service component and provides users and data centres with detailed information about the data acquisition activities during the cruises. This information is crucial for data centres for following up the processing of the data sets and the long-term storage and accessibility towards users.

Weaknesses
These tools have been developed by teams of, sometimes, modest size. The development, maintenance, and evolution of such tools can only continue in a sustainable way if a form of European road map is agreed upon, whose deployment can be based on associations of sustainable competence, which allow the creation of shared tools, maintained and whom the promoters have the real human and financial capacity to support. Otherwise, the payloads and software developed during EUROFLEETS1, EUROFLEETS2 and EUROFLEETS+ will remain prototypes, often promising, but without any descendants.

Opportunities
The EVIOR portal and EARS2 software packages have the potential to become “cornerstones” for the daily operation and management of RVs even if there is still ample room for growth.. The roll-out of identical data handling software and operational facilities on board European RVs will greatly enhance the possibilities for collaboration at large and contribute to improved data quality. In the future, the EVIOR and EARS2 software could evolve in to better interfaces with the tools already in place for the management of national RV fleets and make available, in a centralized and standardized manner, technical, operational and contractual information in order to better coordinate the use of European RV fleets.

Threats
At the end of EUROFLEETS+, if there is no successor project, the EVIOR portal will no longer be maintained due to a lack of funding and clear ownership. A sustainable operating solution, based on ownership and financing of the operation and evolution of this portal is therefore necessary.

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3.4. Developing training and education at sea with young scientists or technicians

The high number of students (65, representing 30 % of the on-board scientific parties) who participated in the EUROFLEETS1 funded cruises, reflects one key priority set by the project to contribute to the training of young scientists. The students comprised of 17 different nationalities with the majority (10) from Italy, followed by Latvia (8) and Ireland (7).

The leverage effect of the European funding has once again been demonstrated through several additional/preparation cruises run on board nationally funded vessels, through training courses run on board RVs put at Project's disposal free of charge by Project's beneficiaries, or through numerous test runs for developed software or underwater payloads with only marginal costs charged to the Project.

In supplement to the efforts made during the EUROFLEETS1 funded cruises to involve students as active members of the on-board scientific parties, EUROFLEETS1 made special efforts towards the training of European emerging scientists and technicians in its "Advanced training and education" WP. They were given training opportunities covering a wide spectrum of scientific disciplines at different levels, providing the attendees with many opportunities to establish contact with fellow students, technicians and/or scientists from different parts of Europe. Some EUROFLEETS member institutions (MI from Ireland, IMR from Norway, TOPAS from Poland and TUI from Estonia) donated ship and/or staff time to prepare and run these courses, and in some cases even private sector companies such as Kongsberg Maritime donated staff time to contribute to the training courses.

Compared to the on-board training courses previously organized in EUROFLEETS1, EUROFLEETS2 demonstrated that there is an increasing demand for the on-board practical training courses, with a total of 51 selected and trained students from 20 nationalities (EU members States: 14, other European: 1, Africa: 2, Asia: 2 and America: 1), from about 400 received applications. In parallel, it broadened access to EUROFLEETS2 funded cruises through i) the recruitment of numerous students or young researchers (representing 45% or 148 persons, of the embarked personnel on funded cruises), ii) the training of junior co-PIs together with well experienced researchers, and iii) the cooperation with the European Geosciences Union (EGU) "Teachers at Sea" programme.

Several actions were implemented to advance towards a higher level of marine researcher training. The proposed actions ranged from i) the organization of specific workshops to help young scientists to write successful TA-applications, ii) the organisation of ship-based practical training courses, iii) a pilot experiment of a Floating University, and iv) several actions fostering the recruitment of students, young marine researchers and high-school teachers as part of the embarked teams of TNA funded cruises.

Strength
The EUROFLEETS mission to make European RVs available to researchers and students across the European community through a well-publicized programme, was very well demonstrated by all the students participating to the training courses organized by the Project. The evaluations of the participants of the training courses cite the experience as an indispensable training opportunity, with the message that the EUROFLEETS2 training programme offers offshore training opportunities not otherwise available and utilizes existing and extremely valuable capacity within many of the European RV fleets. EUROFLEETS1 and 2 are now a reference programme at European level for at-sea training. Successful on-board courses and pilot Floating University demonstrates how offshore training programmes should be integrated into existing national and international postgraduate schools and programmes.

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Weaknesses
Training activities for technicians, young researchers and PIs remain limited in terms of impact. They relied on project participants who already had a training offer in their organization. In the future, this type of training cannot be implemented by RV fleet operators alone but should be co-organized with universities or training schools for technicians and engineers who already have or can deploy training offer in their field of activity.

Opportunities
EUROFLEETS has proven to be an excellent platform for giving access to marine infrastructure to non-traditional users such as early career scientists and users from non-equipped countries. This alliance of RV operators and university/research strengthened both types of institutions reputations within the young scientist's community. A future coordination system should promote access to research infrastructure to early career scientists or to PIs from countries with no or limited access to this infrastructure. This strongly contributes to prepare the next generations of marine researchers and technicians to use modern RVs with sophisticated equipment embarked.

Threats
If consistent and effective training opportunities are not made available to young researchers and technicians, Europe will not have new generations of well trained, networked researchers and technicians in the next 10 to 20 years able to succeed in the global research competition.

3.5. Promoting greener and more sustainable RV and underwater vehicle operations and design

Numerous guidelines were completed during EUROFLEETS1. They cover greening, inter-operability standards, cruise management, common data formats and structures, common communication protocols, etc.

EUROFLEETS has contributed to a better understanding of potential environmental impacts of RV operations, both for the RV operators, the vessel crews and the scientific parties on board, and what could be done to minimize or even eliminate such potential negative consequences. The guidelines which have been developed shows to the RV owners and operators several ways theycan reduce the environmental impact of the operation of their existing RVs and also with regards to designing new RVs as "green" as possible. European RVs built as per the EUROFLEETS guidelines will contribute positively to the necessary environmental protection and climate preservation.

Within this context, a EUROFLEETS2 Joint Research activity was devoted to "Regional RVs guidelines and generic designs" focusing on the definition of guidelines for the design of Regional Research Vessels (RRV), on the definition and development of innovative basic designs of RRVs, and on innovative technologies for optimizing existing vessels. Guidelines and recommendations were developed for the three following design key points of a RV: noise and vibration, bubble sweep-down avoidance and work deck installations.

Taking advantage of the developed guidelines and recommendations, generic basic vessel designs including diverse technological solutions and options were developed, focusing on two vessels sizes: the RRV50 Research Vessel with a 50m length and the BRV35 Research Vessel with a 35m length. Both designs

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are characterized by flexibility (allowing for various missions), high accommodation/equipment standards for research and life at sea, high level of integration of latest technologies, high sea keeping and manoeuvrability performances and environmental friendliness. Green ship technologies and green ship operational measures that exist or that are in development today have been addressed, as well as the potential applicability of each technology to RRVs, making these guidelines a relevant input to the EUROFLEETS2 project. An additional task identified guidelines for optimizing existing vessels.

During the whole project duration, it was important to establish and undertake regular communication between EUROFLEETS2 and parties from industry and beyond, in particular those engaged in operating research and survey vessels and associated equipment, those using marine and ocean data for various user applications, and those engaged in design and outfitting of vessels and manufacturing of scientific equipment.

Concerning the RRV guidelines and generic designs, it was concluded that outcomes of this activity could be interesting for shipyards and ship design companies involved in marine RVs. This is a relatively specialized and limited market. Therefore, in cooperation with RV operators and managers within the EUROFLEETS2 consortium, an inventory of 31 ship designers and 35 shipyards in Europe that have experience with research vessels was compiled. This was implemented as a Workshop and Industry Exhibition as pre-meeting to the IRSO meeting (10 - 13 October 2016, Capri - Italy).

Another EUROFLEETS2 study produced a series of inventory tables covering RVs which were based on the ISO 14001 environmental protection standards. Their use will establish a harmonized approach to the capture of environmental issues within the EUROFLEETS community. The study also proposed the adoption of two definitions for “scope” and “goal” for the RV Life Cycle Cost Assessment (RVLCA) process. It is assessed that their adoption will also influence the way in which the international RV operator community will manage these issues. The RVLCA study also identified the need for the establishment of a common environmental training program.

Strength
EUROFLEETS produced guidelines and recommendations on key design aspects which can be used as handbooks summarizing both best practices and technological aspects to be taken into account as inputs when launching the design of a new vessel or when updating an existing vessel. The generic vessel designs assessed within EUROFLEETS2, built on those recommendations, representing an advanced backbone to develop and build next generation of European green, efficient and multipurpose RRVs.

Weaknesses
The greening of the maritime activity and transport is changing extremely rapidly. Every day new solutions are put forward, especially in the field of propulsion, not all of which corresponds to the specific needs of research vessels. The studies carried out during these projects will soon be outdated if they are not constantly updated.

Opportunities
The extremely strong pressure on the greening of maritime activity can be a great opportunity for European RV fleet operators to develop together studies, standards, and even the RVs of the 21st century, and to work on concepts for more environmentally friendly research campaigns at sea.

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Threats
If RVs do not evolve rapidly, even though they are built for a 30 to 40 years lifetime, they will quickly fall below acceptable environmental standards, and at the same time media and societal pressure will require RV operators to behave in an exemplary manner in terms of a minimum environmental footprint.

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4 Developing the EUROFLEETS+ Strategic plan

The ultimate aim of the EUROFLEETS+ project is to identify and agree on a long-term sustainable RV fleets coordination system (**EUROFLEETS RI**), with a view to consolidate a strategic and coherent vision of the European RV fleet and outlining the future research infrastructure developments within the European Research Area (ERA) key priorities.

Strategy has been studied for years by business leaders and by business theorists. Yet, there is no definitive answer about what strategy really is. Two examples of definition of strategy are reported below:

- Strategy is the pattern of decisions in a company that determines and reveals its objectives, purposes, or goals, produces the principal policies and plans for achieving those goals, and defines the range of business the company is to pursue, the kind of economic and human organization it is or intends to be, and the nature of the economic and noneconomic contribution it intends to make to its shareholders, employees, customers, and communities (Andrews, 1971);
- Strategy is the integrated set of choices that positions the business in its industry so as to generate superior financial returns over the long run (Rivkin, 2000).

Generally speaking, a strategy can be seen as a way of describing *how* you are going to get things done. It is less specific than an action plan (which tells the who-what-when); instead, it tries to broadly answer the question, "How do we get there from here?" A good strategy takes into account existing barriers and resources (people, money, power, materials, etc.).

The basic building blocks of a strategic plan are the **vision, mission and values of a company or an organization**. When articulated in formal statements, they provide the framework for identifying the aspirations (Casadesus-Masanell, 2014, Collin *et al.*, 2008). These statements provide a vision or target goal for the organization to achieve and define what the organization does and why:

- A **vision statement** tells everyone in the community or the world the organization's visions for its constituency as a result of the work of the organization;
- A **mission statement** describes what the organization will do, who it will do it for and how it will achieve the vision;
- A **values statement** describes the principles and beliefs that guides the organisation's operations.

These statements provide a filter through which important decisions for the organization and the standards for evaluating the effectiveness of its programs and activities can be screened. After defining or affirming the vision, mission and values, the next stage of a strategic process is identifying strategic issues.

To accomplish this task, it is necessary to look at conditions and trends in physical, social, economic and political environment that may have a positive or negative impact on the organization's ability to achieve the vision and carry out the mission. It is also necessary to assess internal strengths and weaknesses.

These types of assessments are referred to in the PESTLE[1] (Feys & Probert, 2015) and SWOT analysis (Harrison and John, 2013):

[1] PESTLE is referred to the analysis of Policital, Economic, Social, Technological, Legal and Environmental factors that can influence the organisation and how it operates (Feys & Probert, 2015).

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- **PESTLE analysis** is an audit or external scan of an organization's environmental influences that helps guide the planning and strategic decisions. It is often referred to as providing a 'big picture' of the environment in which a company/organization operates. The assumption is that, if a company/organization is able to audit its current environment and assess potential changes; it will be better placed than its competitors to respond to changes. Often, the analysis will determine likely issues/events that will impact the activities of the company/organization – these are generally considered to be outside the control of the company/organization;
- **SWOT analysis** helps to interpret the findings of the PESTLE analysis to determine the organization's Strengths and Weaknesses (internal assessment of an organization, so looking at controllable factors), and Opportunities and Threats (external assessment of an organization, so looking at outside forces and influences that are beyond the organization's control). It is a critical part of the risk management process.

Once all data from PESTLE and SWOT analysis have been gathered and categorized, it should be convened to review the findings and reset the aspirations. Based on the identified opportunities and threats, it should be decided which of these conditions or situations are having the greatest impact on its ability to fulfil the vision of the organization and which opportunities must be capitalized upon immediately to achieve the organizational vision.

An initial discussion, preparatory to assess the actions to be implemented by the EUROFLEETS+ project consortium to develop a coordination system for European RV operators and to further develop a strategic, coherent and common vision for the European Research Fleet, has been undertaken during:

- WP8 presentation given at the EUROFLEETS+ Kick Off Meeting, 5-7 March 2019, Galway (Ireland);
- WP8 Parallel Session, 7 March 2019, organized back to back to the EUROFLEETS+ Kick Off Meeting;
- A brainstorming session implemented through an on-line survey, launched on 26 March 2019.

The underlying objectives of the on-line survey were:

- To enable the EUROFLEETS+ consortium to understand its mission, vision and values;
- To perform a PESTLE analysis to identify the macro (external) influences that may impact on the EUROFLEETS+ community and its strategy;
- To perform a SWOT analysis to understand Strengths and Weaknesses, and to identify positive (Opportunities) and negative (Threats) external factors.

A preliminary analysis of the survey results has been conducted and presented during a workshop at the 21th ERVO annual meeting (11-13 June 2019, Hamburg, Germany) attended by 50 experts from the community of the European RV operators.

In order to help develop a consortium entity, vision, strategic direction and pathway to develop a fully sustainable collaborative legacy, a collaboration between the EUROFLEETS+ project and the University of Milano Bicocca's "Executive Master's in Management of Research Infrastructures" (EMMRI) team was established.

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The collaboration consisted of:

- A brainstorming session held at the University of Milano Bicocca (Italy) on 17 December 2019, attended by a group of WP8 representatives (CNR, VLIZ, NIOZ, IFREMER and IMR);
- A webinar held on 10 January 2020, in preparation for the EUROFLEETS+ Workshop in Milan (30-31 January 2020);
- A "Strategic Development Programme for EUROFLEETS+" Workshop, held at the University of Milano Bicocca (Italy), 30-31 January 2020, attended by 12 EUROFLEETS+ representatives (VLIZ, EMSO ERIC, CNR, MI, SYKE, NIOZ, IFREMER, DTU Aqua, IMR, HCMR, EurOcean and MARIS).

The achievements of this collaboration were presented to the community of the European Research Vessels Operators (ERVO) group during the ERVO Webinar "Long-term vision for the European Research Fleet" on 19 October 2020, attended by 25 experts among RV operators and EUROFLEETSs+ beneficiaries. The webinar consisted of an oral presentation, a Live poll session and an open discussion.

To advance in the development of the EUROFLEETS+ strategic plan, a second collaboration between the EUROFLEETS+ project and the University of Milano Bicocca's Executive Master's in Management of Research Infrastructures (EMMRI) team was established.

The second collaboration consisted of:

- A brainstorming session, held on the 7 and 22 December 2020, attended by a core group of WP8 beneficiaries (CNR, MI, VLIZ, NIOZ, IFREMER and IMR);
- A webinar, as preparatory activity, held on the 21 January 2021;
- A "Business Model Development" workshop, held on 3, 12 and 22 February 2021, attended by 12 EUROFLEETS+ beneficiaries (CNR, MI, VLIZ, NIOZ, IFREMER, IMR, DTU-Aqua, OGS, SYKE, RBINS, EurOcean and EMSO-ERIC);
- A wrap-up meeting with an enlarged group of EUROFLEETS+ beneficiaries, on 5 March 2021, organized back to back to the 2nd EUROFLEETS+ General Assembly;
- Meetings to finalize the Business Model Report, held on the 27 April and 8 June 2021, attended by the core group of WP8 beneficiaries.

The preliminary achievements of this second collaboration were presented during the 23th ERVO annual meeting (1- 2 June 2021, virtual), attended by 67 experts from the community of the European RV operators.

The general aim of the two Strategic Development Programmes was to develop a competency profile for people working at different management levels within Vessels Research Infrastructure (RI). An RI management focus is required to enable a research infrastructure community such as EUROFLEETS, to access the ESFRI initiative. The community needs to demonstrate a sound and sustainable business model to access stakeholder funding.

The EUROFLEETS+ Strategic Development Programmes were customized to help and facilitate project representatives of the EUROFLEETS+ WP8 activities, developing a strategy for a long-term sustainable model for EUROFLEETS RI.

The development of the EUROFLEETS+ strategic plan is work in progress and will be further developed under EUROFLEETS+ deliverable D8.3 "Report on feasibility study for implementation of a

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transnational access system, including business plan", due in month 36 of the EUROFLEETS+ project plan.

Vision, Missions and Values of EUROFLEETS RI

The EUROFLEETS+ beneficiaries (Annex 1) have extensively worked in order to share their values and to reflect on a shared vision of a perennial European Research Infrastructure (**EUROFLEETS RI**) and its missions.

EUROFLEETS RI is a pan-European initiative aimed at uniting the European world-class RVs and associated equipment among European partners to facilitate access to unique marine infrastructures for a wide user community, enabling excellent research, increased cooperation in technical development and transfer of knowledge in RV operations & management, increase ocean literacy, and provide a clear roadmap for the continued integration and advancement of the European research fleet.

The **EUROFLEETS RI aspirations** are the following:

- **Vision**

We believe that cooperation and strengthening links between the operators of European marine research fleets is a necessity for continued excellent marine research and monitoring in Europe.

We believe that it is time to develop and implement a legal entity endorsed by the EU Member States and associated countries, and acting in accordance with their interests, to enable transnational governance, strengthen the coordination between national research vessel operators, and bring to light innovative supra-national dimensions at a European level.

- **Missions**

To be the central coordination point for Transnational Access (TA) funded by the EU.

To be a "market place" for those offering access to Research Vessels (RVs) and/or Large Exchangeable Instruments (LEXIs), and those looking for charter, barter or in-kind contribution to research projects, monitoring activities, logistical functions, training of students, young scientists and technicians etc.

To coordinate sharing or pooling of sophisticated/expensive facilities to optimize their use, by maintaining and validating the European RV and LEXI databases.

To host permanent or temporary technical groups dedicated to exchange of best practices and shared developments such as operational standards for vessels and equipment, acquisition standards and associated software.

To build up and pilot the pre-configuration processes of future common infrastructures, the realisation of which can no longer in each and every case be the responsibility of a single country (e.g. inhabited diving, large shared seismic systems…).

To support research and development projects for eco-designed and eco-responsible European RVs of the 21st century.

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❖ **Values**

As operators of public RVs, we believe:

- In the need for our countries and for Europe to develop marine research and monitoring of excellence, open to large-scale international cooperation;
- In the importance of providing the scientific community with up-to-date scientific instruments and equipment adapted to the needs of marine research and monitoring;
- In providing quality open data useful to the entire European scientific community;
- That the links developed in the various European infrastructure networks and projects (e.g. Eurofleets1, E2 and E+) should be structured to be more sustainable and strengthened in order to improve efficient use of the RV fleets and associated instruments and equipment to enable improved return on investment.

We support Europe in meeting the objectives of sustainable development, in particular those of UN Sustainable Development Goal (SDG) 14 and are committed to the International Research Ship Operators (IRSO) Code of Conduct for Marine Scientific Research Vessels.

We are committed to transparent operations, oriented towards the service of scientific excellence and not towards financial or commercial profit.

The EUROFLEETS RI aspirations, Vision, Mission and Values were first presented to the Marine RI stakeholders and the European Commission during the first Eurofleets+ International Stakeholder workshop, coordinated by WP5 and held in April 2021. Eurofleets set out its vision to become the hub for marine research across the European Marine RI landscape in enabling, supporting and implementation key research across all domains.

Subsequently this message has been broadly conveyed at several events, including:

- European research infrastructure synergies hosted by EU Marine Robots on 15 April 2021 to elaborate on a joint view on research infrastructure projects and identify synergies & convergence;
- EuroGOOS International Conference 2021 - European Research Infrastructures session, on 5 May 2021 focused on the status of European Marine Research Infrastructures, a key mechanism to sustain observing systems in Europe;
- Cooperation Framework Between Marine Research Infrastructures - Side Event of the EuroGOOS International Conference 2021 hosted by EURO ARGO on 5 May 2021 to convene scientists and officers from marine Research Infrastructures (RIs) and marine research communities across Europe, to discuss a future strategy under a collaborative plan within the landscape of the UN Decade of Ocean Science and the European Ocean Observing System (EOOS)
- Marine robotic infrastructures network: lessons learned and future developments - All Atlantic 2021 side event which took place on the 2 June 2021. which explored the lessons learned and building on the success of the EU Marine Robots project with a view to all-Atlantic exploration, observation, sustainable exploitation, and new science and services enabled by innovative technology;

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- European Conference of Aix-Marseille University: Protect Our Oceans, The Challenge of Europe's Global Leadership held on 16 June 2021, addressing the role RVs can play in the challenge addressed by the panel discussion, *Can science help prevent from further impact of climate-change on marine ecosystems?*

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5 Conclusion

The detailed SWOT analysis highlights significant strengths, weaknesses, but also opportunities at the end of the EUROFLEETS 1, EUROFLEETS2 and EUROFLEETS+ projects, from which the WP8 members were able to initiate work to define scenarios for a future European fleet coordination platform. With the help of the University of Milano Bicocca (UNIMIB), we have therefore worked to identify the values we share, the vision we have of a future infrastructure, as well as the missions it could fulfill.

The results of this deliverable are the foundation for the group's ongoing work to define a business model, with a renewed desire to propose sustainable and ambitious solutions to expand European cooperation in the field of research fleets, beyond the EUROFLEETS 1 and 2 projects, and into EUROFLEETS+ which will soon be completed.

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Annex 1

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Annex 2

EUROFLEETS2 – Deliverables

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Deliverable available | Contractual Deliverable | Public Deliverable

	Deliverable nr	Deliverable name	Lead beneficiary	Nature of the D*	Dissemination level**	Actual Delivery Date	Due Date (DD)	Comments
Period 1 (M1 to 18)	D1.4	Implementation of the collaborative site	Ifremer	O	CO	03/06/2013	3	Collaborative site opened to all beneficiaires and accessible at : https://share.ifremer.fr
	D5.1	Definition of Regional 1 Call (Polar & Subpolar), Super Integration and Embarked Equipment	AWI	R	PU	08/07/2013	6	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D7.1	Report on workshop on regional TNA calls	TUT	R	RE	30/09/2014	6	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D12.7	Need analysis for pressure-neutral power systems	Ifremer	R	CO	29/09/2013	9	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D3.1	Status and foreseeable evolution of the European and International Polar Research Fleets & equipment	CSIC	R	PU	21/01/2014	10	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D1.2	General Assembly minutes	AWI	R	CO	27/03/2014	12	Minutes of KoM/GA1 available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D12.3	Algorithmic Concept for Hovering	DFKI	R	CO	01/08/2014	12	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D4.1	Definition of a multifaceted scheme for Regional virtual fleet trans-national cooperation	CNR	R	CO	01/06/2014	12	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D5.2	Definition of Regional 2 Call (Medit. Sea, Northern Atlantic, others) and Embarked equipment	AWI	R	PU	09/01/2014	12	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D6.1	Inventory of potential companies and existing Public Private Partnerships in the EUROFLEETS domain	MARIS	R	CO	11/11/2014	12	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D6.4	IPR Guidelines	RBINS-MUMM	R	CO	19/11/2014	12	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D12.12	Specification onpressure-neutralhigh intensityLED light array-Test bench	MARUM	R	CO	20/12/2014	14	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D12.5	Identification algorithm based on self-oscillations and validation report	UNIZG-FER	O	CO	30/04/2014	14	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D12.8	Report on lab-test of pressure-neutral cells	Ifremer	R	CO	23/09/2014	14	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D12.9	Specification on BMS for LiPo	MARUM	R	CO	13/03/2015	14	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D12.11	Specifications of the LiPo and Li-ion demonstrators	MARUM	R	CO	13/03/2015	16	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D3.2	Report on the feasibility of year round, regular research operations in ice-covered areas	SPRS Transfered to CSIC	R	PU	02/04/2015	16	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D5.3	Selection Report for Regional 1, Super Integration and Embarked Equipment	MI	R	PU	30/05/2014	16	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D1.1	Quality Indicators review	Ifremer	R	CO	28/11/2014	18	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D1.3	ExComm Actions lists review	AWI	R	CO	10/11/2014	18	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D12.4	Test results withthe Algorithm on a exemplarySystem	DFKI	R	CO	19/09/2014	18	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D2.1	Fleet EvolutionGroup progressreport	MI	R	CO	31/10/2014	18	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D2.5	European and international partnerships progress report	AWI	R	CO	21/05/2015	18	To upload on the collaborative site and to submit to the EC

Deliverable available | Contractual Deliverable | Public Deliverable

	Deliverable nr	Deliverable name	Lead beneficiary	Nature of the D*	Dissemination level**	Actual Delivery Date	Due Date (DD)	Comments
	D2.6	Report on communication and outreach progress including public website visit statistics	EurOcean Foundation	R	CO	24/09/2014	18	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D5.4	Definition of Regional 3 call (North and Baltic Sea)	AWI	R	PU	19/12/2014	18	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D6.2	Inventory andassessment ofpotential areasof public private cooperation - Draft	MARIS	R	CO	06/06/2016	18	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D7.5	Training modules and documents provided on thewebsite	MI	R	RE	13/03/2015	18	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D3.3	Identification of the high priority investigation areas equipment requirement	OGS	R	CO	29/01/2016	20	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D4.5	Organization of workshops (2) tuned to the release of the upgraded software components	Ifremer	O	CO	26/10/2015	20	1st workshop to be held on 25-26 October 2015
	D5.5	Selection Report for Regional 2	AWI	R	PU	30/01/2015	22	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D1.22	D1.2-V2 General Assembly minutes	AWI	R	CO	05/03/2015	24	Minutes of GA2 available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D11.1	Guidelines and recommendationsfor ship design on noise and vibration reduction	IMR	R	PU	03/12/2014	24	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D11.2	Guidelines and recommendations for ship design on work deck installation	Ifremer	R	PU	27/11/2015	24	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D12.1	Textured Micro-Bathymetryalgorithms	UdG	O	CO	28/09/2015	24	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D13.1	EARS ontology integration	RBINS-MUMM	P	CO	19/05/2015	24	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D13.4	Data acquisitionsoftware prototype	Ifremer	P	CO	05/05/2015	24	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D2.3	Report on progress of European shared scheduling tool	Ifremer	R	CO	17/10/2015	24	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D4.4	Regular updates of the EVIOR portal	MARIS	O	PU	11/03/2015	24	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D12.13	Report on lab-test of pressure-neutral energy LiPo-system for underwater systems	MARUM	R	CO	08/02/2016	30	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D12.14	Report on lab-test of pressure-neutral energy Li-ion for underwater systems	Ifremer	R	CO	28/06/2016	30	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D13.2	Implementation of the vocabularies infrastructure	RBINS-MUMM	R	CO	27/06/2016	30	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D13.5	SSR (Ship Summary Report), ER-CDI	RBINS-MUMM	P	CO	27/06/2016	30	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D7.3	Report on DANA floating university pilot experiment	DTU Aqua	R	CO	27/10/2015	30	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D4.52	D4.5-v2 Organization of workshops (2) tuned to the release of the upgraded software components	Ifremer	O	CO	04/11/2016	32	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D6.3	Detailing and evaluation of a number of high potential business cases	MARIS	R	CO	20/06/2017	32	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
Period 2 (M19 to 36)	D5.6	Selection Report for Regional 3	AWI	R	PU	02/12/2015	34	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables

Deliverable available | Contractual Deliverable | Public Deliverable

Deliverable nr	Deliverable name	Lead beneficiary	Nature of the D*	Dissemination level**	Actual Delivery Date	Due Date (DD)	Comments
D1.12	D1.1-v2 Quality Indicators review	Ifremer	R	CO	25/05/2016	36	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D1.23	D1.2-V3 General Assembly minutes	AWI	R	CO	21/04/2016	36	Minutes of GA3 available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D1.32	D1.3-v2 ExComm Actions lists review	AWI	R	CO	23/05/2016	36	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D10.1	Synthetical document about EUROFLEETS2 TNA3 funded cruises	MARUM	R	CO	10/06/2016	36	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D11.3	Guidelines and recommendations for ship design on bubble sweep down avoidance	CNR	R	PU	15/11/2016	36	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D11.4	Report on innovative basic designs of RRVs - Part 1	GeoEcoMar	R	CO	12/12/2016	36	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D12.2	3D Optical Model algorithms	UdG	O	CO	30/05/2016	36	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D13.3	EARS Help desk, specifications and minor releases	Ifremer	R	CO	03/03/2016	36	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D13.6	Metadata specifications and implementation of the model	OGS	P	CO	24/01/2016	36	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D2.12	D2.1-V2 Fleet Evolution Group progress report	MI	R	CO	27/07/2016	36	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D2.52	D.2.5-v2 European and international partnerships progress report	AWI	R	CO	02/05/2016	36	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D2.62	D2.6-v2 Report on communication and outreach progress including public website visit statistics	EurOcean Foundation	R	CO	08/03/2016	36	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D4.2	Reporting and evaluation of initiatives with pioneering groups	Ifremer	R	CO	30/06/2017	36	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D4.42	D4.4-v2 Regular updates of the EVIOR portal	MARIS	O	PU	05/04/2016	36	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D4.6	Draft of documentation to place a pan-European Regional research fleet project on the ESFRI road map	DTU Aqua	R	CO	29/06/2017	36	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D6.5	Overview of exploitable results to be transferred to industry	RBINS-MUMM	R	CO	25/08/2017	36	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D7.4	Report on access program and technician training	MI	R	CO	06/02/2017	36	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D8.1	Synthetical document about EUROFLEETS2 funded cruises	HCMR	R	CO	10/06/2016	36	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D12.6	Tracking and dynamic positioning algorithm based on optical data and validation report	UNIZG-FER	O	CO	24/06/2016	38	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D3.4	Current and future European demand for PRV and foreseeable gaps in the capacity of the fleet	CNR	R	CO	14/11/2016	38	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D3.5	Report on recommended scenarios and tools to optimally fulfil European Polar Research needs	CSIC	R	CO	17/09/2016	38	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D5.7	Fundamental Set of Rules for an European System	ESF	R	PU	13/09/2016	39	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
D13.7	Shore to ship e-access - data and metadata	OGS	R	CO	09/05/2017	42	To upload on the collaborative site and to submit to the EC

Deliverable available | Contractual Deliverable | Public Deliverable

	Deliverable nr	Deliverable name	Lead beneficiary	Nature of the D*	Dissemination level**	Actual Delivery Date	Due Date (DD)	Comments
Period 3 (M37 to 48)	D2.4	European shared scheduling tool	Ifremer	P	CO	20/03/2017	42	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D1.13	D1.1-v3 Quality Indicators review	Ifremer	R	CO	28/08/2017	48	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D1.33	D1.3-v3 ExComm Actions lists review	AWI	R	CO	30/03/2017	48	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D10.12	D10.1-v2 Synthetical document about EUROFLEETS2 TNA3 funded cruises	MARUM	R	CO	02/06/2017	48	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D11.5	Report on innovative basic designs of RRVs - Part 2	CNR	R	CO	28/02/2017	48	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D11.6	Report on innovative technologies for optimisation of existing ships, guidelines and recommendations	IMR	R	CO	01/02/2017	48	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D2.13	D2.1-V3 Fleet Evolution Group progress report	MI	R	CO	04/08/2017	48	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D2.2	Report on EUROFLEETS heritage	Ifremer	R	CO	24/08/2017	48	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D2.53	D2.5-v3 European and international partnerships progress report	AWI	R	CO	05/05/2017	48	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D2.63	D2.6-v3 Report on communication and outreach progress including public website visit statistics	EurOcean Foundation	R	CO	06/07/2017	48	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D2.7	Shared scheduling tool validation report	Ifremer	R	CO	30/06/2017	48	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D3.6	Report on implementation models, governance and sustained stakeholder involvement	AWI	R	CO	04/05/2017	48	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D4.3	Review of existing large scale seismic technology and future equipment trends	OGS	R	CO	06/03/2017	48	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D4.43	D4.4-v3 Regular updates of the EVIOR portal	MARIS	O	PU	22/03/2017	48	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D5.8	Report on the dissemination of this shared Evaluation Model	AWI	R	PU	03/05/2017	48	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D7.2	Report on onboard training courses	CNR	R	CO	30/03/2017	48	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D8.12	D8.1-v2 Synthetical document about EUROFLEETS2 funded cruises	HCMR	R	CO	27/07/2017	48	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables
	D9.1	Report introducing the lessons learnt from TNA2 experiment	MI	R	CO	28/02/2017	48	Available on the collaborative site, folder EUROFLEETS2/03-Follow-up/Final Deliverables

*** Nature :**

R = Report
O = Other

**** Dissemination**

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