Consiglio Nazionale delle Ricerche | Dipartimento Scienze del Sistema Terra e Tecnologie per l'Ambiente

Research Vessel Gaia Blu: Strategic Framework for Italy's Flagship Marine Research Infrastructure

Index

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Research Vessel Gaia Blu:
Strategic Framework for Italy's Flagship Marine Research Infrastructure

1 Introduction

The Research Vessel (R/V) Gaia Blu (Figure 1) is a national asset dedicated to advancing Italy's leadership in marine science, ocean observing, and deep-sea exploration.

Figure 1 R/V Gaia Blu

As a state-of-the-art platform equipped with advanced instrumentation, Gaia Blu supports a wide spectrum of scientific activities, from oceanography and biology to geology and atmospheric sciences.

The R/V Gaia Blu serves as the primary research vessel for the National Research Council of Italy (CNR). The instrumentation and technology upgrade made between 2023 and 2025 enables the vessel to conduct comprehensive studies in geology, oceanography, biology, and atmospheric sciences across the Mediterranean Sea and in the ocean regions. The ship is suitable for being upgraded to meet Polar Code requirements, allowing operations in polar regions.

The operational management is under the responsibility of the Research Infrastructure Office, and the ship management contract armament is under the responsibility of the Department of Earth System Sciences and Technologies for the Environment (DSSTTA-CNR).

This document describes the management guidelines and operating procedures for access to and use of the R/V Gaia Blu. The document describes: i) the technical characteristics of the vessel and the scientific instruments available on board, ii) the flow chart for the management of the vessel's activities, iii) the access modalities for the use of the vessel, iv) the guidelines for managing the data collected in accordance with international policies, v) the metrics for verifying the short and medium-term results obtained from the oceanographic campaigns and vi) the access rules to the vessel for commercial activities.

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This document has been validated by the Scientific Committee, established by decree n. 84734/2025, and by the international Advisory Board appointed within the same decree.

This document represents the ultimate decision-making tool for the operational management of the R/V Gaia Blu.

2 Flow chart of the governance

Introduction

To ensure the effective management of scientific, logistical, and administrative activities, a structured governance framework has been established. This framework involves various roles and responsibilities. Below is a description of all the parties involved, along with their objectives and roles.

2.1 Infrastructure Manager

Objectives:

- To coordinate the operational working groups.
- To serve as the point of reference for all matters related to the operation of the ship and onboard activities.
- To participate in the Technical Coordination Panel for the management of the ship charter contract.
- To publish the calendar and oversee its implementation, including any potential changes.
- To act as the official voice of the CNR towards the scientific community, making decisions with the support of the four Working Groups (WGs).

Role:

The Infrastructure Manager is the central figure in the operational management of the ship, ensuring coordination among the various working groups and the overall efficiency of onboard operations. The Infrastructure Manager oversees the operational working groups, which are composed of CNR personnel selected by the Research Infrastructure Office following a call for expression of interest.

2.2 Operational Working Groups (OWGs)

Four operational working groups (OWGs) have been established to manage different aspects of RV GAIA BLU's operations:

1. Access Working Group
2. Logistics and Investment Working Group
3. Data Working Group
4. Communication and Outreach Working Group

The objectives and roles of each group are detailed in Table 1.

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Working Group	Role	Objectives
Access working group	The Access Working Group is responsible for managing requests to use the vessel, ensuring that scientific activities are selected and scheduled in a transparent and efficient manner	• Define the selection criteria for access to the vessel by the scientific community. • Manage the evaluation of proposals, activating expert review panels when necessary. • Draft the annual schedule of at-sea activities and approve any necessary adjustments. • Analyze post-cruise scientific reports to assess whether the planned objectives have been achieved. • Develop the access plan for the infrastructure and manage key logistical aspects. • Evaluate opportunities for scientific or commercial collaboration, including potential
Logistics and Investment Working Group	This group ensures that all logistical operations and investments in instrumentation are managed effectively, supporting scientific activities on board.	• Provide logistical support for the preparation and handling of equipment. • Maintain and update the inventory of onboard instruments, planning any necessary repairs. • Analyze post-cruise feedback to monitor the quality of ship services. • Contribute to the development of a strategy for technical investments, based on emerging scientific needs.
Data Working Group	The Data Working Group ensures effective and transparent management of the data collected during scientific cruises, promoting data sharing and accessibility	• Develop the data policy based on international best practices. • Define a data management plan to be signed by the chief scientist prior to boarding. • Support data management planning, promoting Open Science principles in line with the European Open Science Cloud (EOSC).
Communication and Outreach Working Group	This group offers scientific support for disseminating the activities and research results generated on board the vessel, thereby strengthening the visibility and impact of the conducted research.	• Scientific collaboration with the CNR competent offices* for the implementation of outreach initiatives related to the Gaia Blu research vessel. • Contribution to the definition and updating of content for the Gaia Blu web page. • Support in collecting and producing audio-video materials to promote the vessel's activities.

**Research Infrastructure Office, Public Relations and Integrated Communication Unit, Press Office Unit*

Table 1 Operational Working Groups' descriptions

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2.3 Scientific Committee

Composition:

- DSSTTA-CNR Director (Chair of the Committee)
- Head of the Research Infrastructure Office
- Directors of the DSSTTA-CNR Institutes
- Engineering, ICT and Technologies for Energy and Transportation Department (DIITET-CNR) Director
- Department of Social sciences and humanities, cultural heritage (DSU-CNR) Director

Objectives:

- To define a long-term scientific plan aligned with EU and international strategies.
- To identify annual priorities for vessel use and promote access calls.
- To foster international scientific collaborations.
- To evaluate the impact of completed scientific campaigns.
- To identify and propose priorities for investments in scientific instrumentation, in coordination with the Logistics and Investment Working Group.
- To communicate strategic guidelines to the working groups for operational implementation.

Role:
The Scientific Committee guides the vessel's activities from a strategic perspective, ensuring that the research conducted aligns with national and international scientific priorities.

2.4 Advisory Board

Composition:

- 5 international outstanding experts selected based on their scientific background

Objectives:

- To support the Scientific Committee in defining a long-term scientific plan aligned with EU and international strategies.
- To help the Scientific Committee in identifying annual priorities for vessel use.

Role:
The Advisory Board supports the Scientific Committee to identify national and international scientific priorities during an annual meeting.

2.5 Technical Coordination Panel

Composition:

- Infrastructure Manager
- DSSTTA-CNR Director (contract holder with the ship operator which manages the vessel on behalf of the CNR shipowner)
- Head of the Research Infrastructure Office
- Legal expert (for contractual matters)
- DEC (Contract Execution Director)

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- Deputy DEC
- RUP (Sole Project Manager)
- Deputy RUP

Objectives:

- To act as a direct interface with the ship operator.
- To monitor the progress of the contract with the ship operator.
- To verify the appropriateness of the ship operator's expenditures in relation to the scientific activities performed and the contractual obligations.
- To assess the feasibility of scientific campaigns, supporting researchers during the planning phases.
- To make decisions regarding contractual and logistical issues.
- To oversee the terms and conditions of the contract renewal.
- To assist the RUP (Responsible Officer for the Procedure) in preparing the financial plan.
- To define and monitor the rules and procedures related to third-party activities.
- To facilitate, when necessary, the involvement of relevant CNR personnel to address specific management issues (e.g., High Seas declaration for VAT purposes, coordination with the Financial Planning and Control Office to ensure smooth financial flows, etc.).

Role:

The Technical Coordination Panel is the decision-making body responsible for monitoring the correct implementation of the ship charter contract and the vessel's operational activities. It interfaces with the Infrastructure Manager and, by extension, with the operational working groups. In particular, the DEC, Deputy DEC, and the RUP and the Deputy RUP work in close coordination, also interacting directly with campaign leaders to assess the feasibility of activities and to liaise with the ship operator.

2.6 Administrative and Technical-Contractual Roles

DEC – Contract Execution Director

Objectives:

- To supervise the charter contract throughout all its phases.
- To ensure consistency between activities and expenditures.
- To collaborate with researchers in defining and planning campaigns.
- To serve as an interface with the ship operator.

Role:

The DEC ensures that all activities (both for the operation of the vessel, including ordinary and extraordinary maintenance, and scientific activity) are carried out in compliance with the charter contract, guaranteeing proper resource management.

Deputy DEC

Objectives:

- To replace the DEC in his absence.
- To perform equivalent operational duties, including document signing.
- To provide direct support to researchers.

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Role:
The Deputy DEC ensures continuity in the DEC's functions, supporting both operational and administrative activities.

RUP and Deputy RUP (Sole Project Manager)

Objectives:

- To manage and monitor financial flows related to the contract.
- To participate in the technical and administrative feasibility assessments of campaigns.
- To ensure compliance with administrative and procurement procedures throughout the execution of the contract.
- To support the preparation of financial plans and reports, in coordination with the DEC and the Financial Planning and Control Office

Role:
The RUP and Deputy RUP ensure the proper financial management of activities related to the vessel, guaranteeing compliance with applicable regulations.

2.7 Gaia Blu Operational workflow

- DEC and Scientific Committee: Both assess the feasibility of campaigns, but from different perspectives — the DEC focuses on technical and administrative aspects, while the Scientific Committee evaluates the scientific rationale.
- Logistics and Investment Group and DEC: Both contribute to technical and logistical support. The DEC oversees contractual management, while the Logistics Group acts as an interface between the Infrastructure Manager and the scientific community.
- Access Group and Scientific Committee: The Scientific Committee defines the strategic guidelines, whereas the Access Group is responsible for their practical implementation.

  Infrastructure Manager and DEC: Both provide support to researchers, but with different scopes. The infrastructure Manager is responsible for technical and operational matters, while the DEC handles contractual and administrative responsibilities.

Figure 2 illustrates the operational workflow of the R/V Gaia Blu governance.

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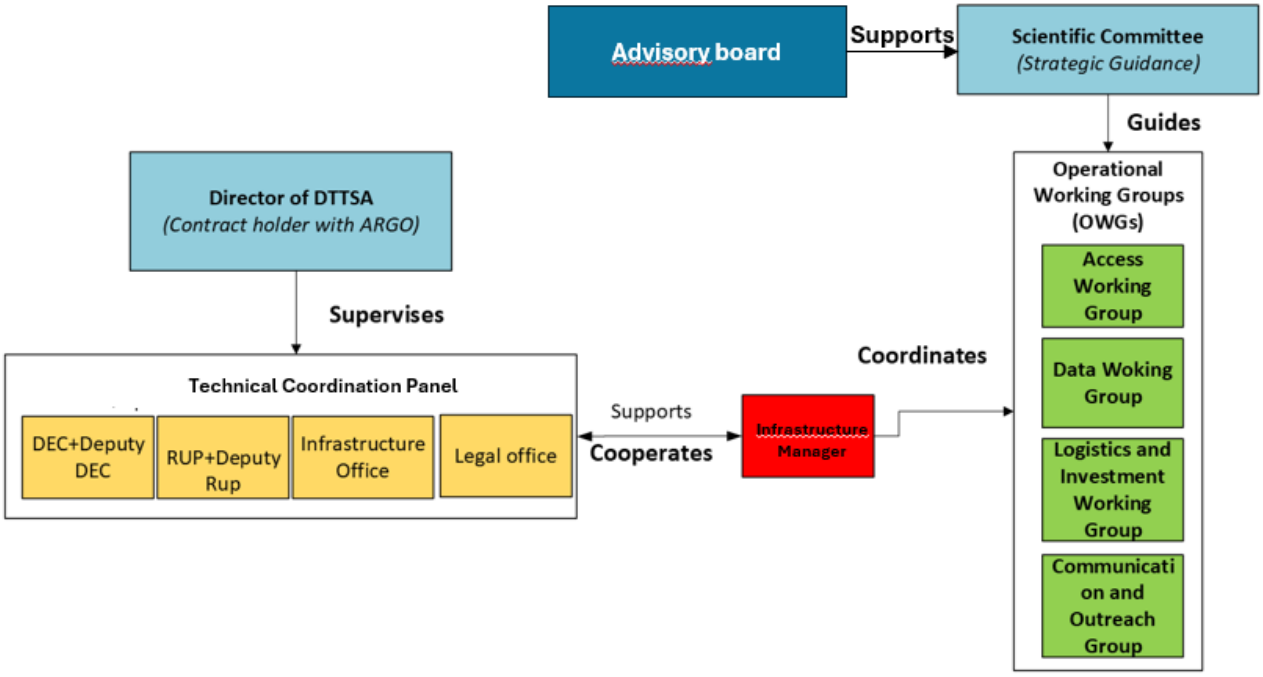

Figure 2 R/V Gaia Blu governance

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3 Mapping of instruments and technical (and space) constraints for new tools

Vessel Characteristics

- Length: 82.90 m
- Breadth: 13.00 m
- Draft: 4.80 m
- Gross Tonnage: 2024 t
- Motor: 2 x 2941 kW
- Thruster: 1 x 400 kW, DP0
- Stabilizing fins: 2
- Maximum speed: 17 nodes
- Cruising speed: 11 nodes
- Endurance: 25 days
- Cabins: 23
- Scientific personnel: 21 researchers + 2 technical staff
- Crew: 18
- Desalination system
- Hull type: Single reinforced steel hull
- Working Boat: PALFINGER FRSQ 630
- Ship certification: 100 A5 E2 Special Purpose Ship

Net Connection

- C-band Maritime VSAT Antenna System (v240 C)
- Sea Tel 97 series
- Land communication system (LTE, 5G)
- Starlink Flat High-Performance Kit (Maritime/Energy)

Deck Facilities (Stern, 11.4 x 10.8 m)

- J-frame (32 kN) with relocatable winch with Dyneema cable (2000 m)
- Crane HIAB 121-2, 133 kN (left)
- Crane HIAB 301–4, 250 kN (right)
- A-frame (89 kN) with multipurpose Ibercisa 90 kN winch, operated from cargo deck, with steel cable (6000 m x 12.8 mm)
- Garage with workspace area (18 x 5 m)

Cargo Deck

- Multipurpose space with power sockets and water connection and reinforced base
- Container ISO20 top open (spare corer head, corer barrels and liners, swing system spare parts, spare Carousel, bottles and CTD)
- Container ISO20 (fridge)
- Container ISO10 (sediment corer spare parts)
- Container ISO20 (ROV with its spare parts) – starting from 2026

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Scientific instruments hull-mounted

- Kongsberg EM 2040-04 (200-400 kHz) – Multibeam echosounder (< 200 m)
- Kongsberg EM712 (70-100 kHz) - Multibeam echosounder (200-1000 m)
- Kongsberg EM304 (50 kHz) – Multibeam echosounder (1000-5000 m)
- Kongsberg Seapath 380 – positioning system
- Valeport: Sound Velocity Profiler MIDAS SVP (6000 m), Sound Velocity Sensor MiniSVS, altimeter VA500
- Kongsberg Seatex MRU-5 Motion Sensor
- SIMRAD EK60 – 6 single beam echosounders (ES18, ES38B, ES70-C, ES120-7C, ES200-7C, 710-30)
- SIMRAD EA600 – 4 single beam echosounders (12-16, 38-9, 120-25 e 200-28)
- SH90 – sonar
- Teledyne Workhorse Mariner ADCP – 300 kHz Acoustic Current Profiler (depth range 100-120 m)
- Pinnacle ADCP – 45kHz Acoustic Current Profiler (depth range up to 700-1000 m)
- Knudsen 3260 – Chirp sonar profiler, 12 kHz + 9 Transducers 3.5 kHz
- HiPAP 352(P) – Ultra-short baseline system (USBL), underwater positioning

Scientific instruments on bridge deck and mast

- Photometer CIMEL 318-T (Univ. Lille, LOA/CNRS/ISMAR Roma)

SORAD Hyperspectral radiometers for continuous measurements of radiance and irradiance

- Lidar for measuring optical properties of the sea and the atmosphere
- Weather station Ecosearch SM45, Apogee
- SP-510 Thermopile Pyranometer
- LI-COR, LI-192 –PAR sensor Campbell Scientific
- CSAT3B – Triaxial Sonic Anemometer
- SI-111 – infrared radiometer
- Datalogger Campbell Scientific CR1000X
- FishSky 360°– All Sky Camera

Sediment Coring system at starboard

- Handling system Carmacoring (Carma® Handling system)
- Piston corer CP-20
- 90 kN Ibercisa winch with steel cable (6000 m)

Water sampling and profiling

- LARS and Ibercisa (40 kN) winch with 6000 m Vectran cable (10.7 mm diameter)
- CTD SBE 911plus (with redundant sensors for temperature, conductivity and dissolved oxygen) (x2)
- Teledyne RDI Workhorse 300 kHz Sentinel Self-Contained Lowered ADCP (x2)
- SBE32 Carousel with 24 Niskin bottles (12 L)
- ASY-PAR-00044 - Underwater PAR sensor
- ECO-FL-RTD G4 (CHL) Chlorophyll a Fluorescence sensor range 0-125ug/l
- ECO-NTU-RTD Turbidity Meter, range 0-125 NTU
- SBE 27, pH/redox sensor
- Valeport Sound Velocity Profiler MIDAS SVP (6000 m)
- SBE 17plus V2 Searam

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- 24 Ultraclean bottles, OTE mod. 114 close-open-close C-Free Chamber (12 L)
- PVC water line for continuous sampling with constant flow helical pump

Wet Lab

- Extractor hood
- Refrigerators (+4, -20, -80 °C)
- Heater

Science store

- Thermosalinograph (SBE45 MicroTSG) with SBE38 and debubbler VORTEX
- MilliQ EQ 7008 system
- Underway flow through measuring system "Ferrybox": Sea surface salinity, sea surface temperature (SBE 45 MicroTSG), integration of SBE38 remote T, dissolved oxygen (AANDERAA 4835), pCO2 (HydroC-CO2-Contros), spectrophotometric pH (HydroFIA-pH), total alkalinity (HydroFIA-TA), Chlorophyll, Turbidity, f-DOM (ECO-Triplet, optional)

  FlowThrough system: Vortex debubbler AC-S Spectral Absorption, ECO-Triplet (optional, shared with the Ferry-box)
- Salinometer (Autosal 8400B, OSIL)

Computing Center

Cluster (computing/virtualization (4 nodes with 1 processor Intel Xeon Gold, 16C/32T, 128 Gb RAM, 2 HD of 480GB, 4 10GbE base-T ports

- Storage system:
  - 12Tb SSD Read Intensive
  - 100Tb SAS/SATA with RAID6 configuration switch Top of the Rack, with 28 10Bse-T ports and 2 QSFP28 ports
- Tape Library:

Semi-resident instruments

Oceanic Box corer operated by the multipurpose Ibercisa 90 kN winch

Scientific instruments currently being installed

A semi working class ROV modified AEGIR 250 from Ocean Robotics equipped with a TMS (Tether Management System):

- maximum depth rating of 3000 m
- 7 thrusters to enable full control in the pitch and roll directions
- 4K and Full HD cameras
- 2 hydraulic manipulators (5 and 7 functions)
- Stereo camera system for 3D photogrammetric modelling

Pending a feasibility assessment, a 20 kJ sparker system for seismic reflection of strata up to 400 ms penetration down to the seafloor in 0-4000 m water depth settings.

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4 Data and data management

Data Policy

The primary goal of the missions aboard the R/V Gaia Blu is to collect diverse marine environment data, including oceanographic, geological, geomorphological, biological, and microbiological information. This data is crucial for understanding and monitoring marine dynamics, underwater geological processes, marine biodiversity, and the impacts of environmental changes.

The R/V Gaia Blu features moreover an onboard data center for digital data collection and archiving, with pre- and post-processing capabilities and an LTO tape-based Data Transport System (DTS) that enables rapid transfer of large data volumes up to 100 TB per campaign.

The data collection system is completed by an on-shore data type library, to ensure the correct data preservation. The final public data will be upload on the IT-IOOS infrastructure and portal (Figure 3).

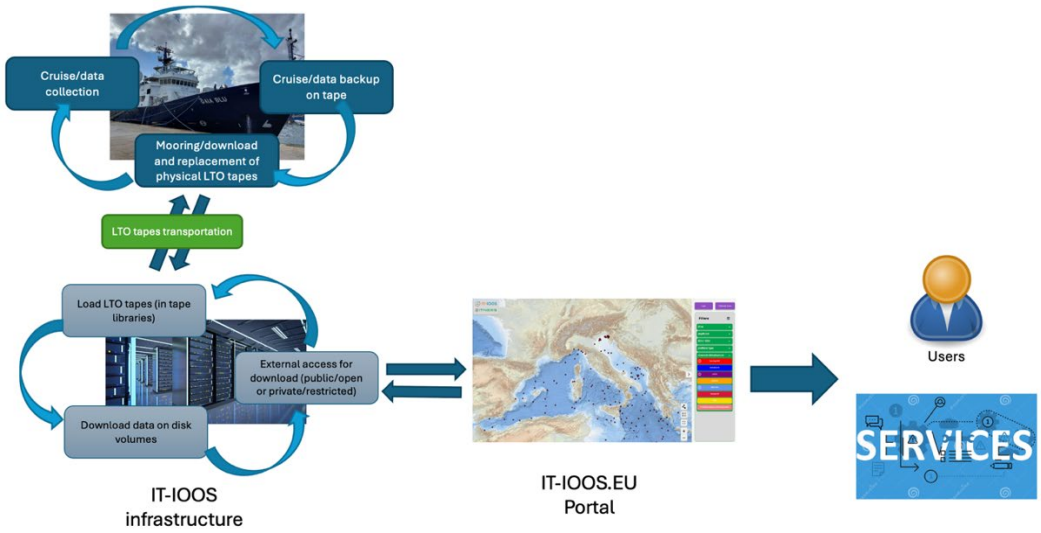

Figure 3 Gaia Blu's digital data lifecycle

The Research Data Management will be conducted according to the guidelines of a specific Data Management Plan (the R/V Gaia Blu DMP) and its Data Policy Annex. The Gaia Blu DMP identifies the types of data and the management methods promoted by the Vessel.

Additionally, it is required that in the proposal for the R/V Gaia Blu's ship time request, the Principal Investigator (PI) outlines a specific Data Management Plan (DMP) for the campaign using a dedicated template. This DMP must complement and integrate with the Gaia Blu DMP, including detailed information on the types of data to be managed and the methods. Any differences from the Gaia Blu DMP must be adequately justified and explicitly approved. All documents related to each campaign (DMP, reports, etc.) will be made available through the general-purpose catalogue, either via the Gaia Blu website or through IT-IOOS.

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Research data, as identified and defined by the Gaia Blu DMP, are managed, archived, and made freely available for scientific research or public interest purposes.

The research data will be available as soon as possible, in accord to the DMP and data policy, through the IT-IOOS web portal, following international standards. Every Researcher must manage the Research Data according to the IT-IOOS infrastructures and the **FAIR ("Findable, Accessible, Interoperable, and Reusable") Principles**: it is a set of guiding principles that were proposed to improve the management and stewardship of scientific data. These principles are fundamental and do not prescribe any specific technology, standard, or implementation method.

- **Findable**

  Gaia Blu data are made discoverable through a comprehensive cataloging system consisting of two main components:

  - General-Purpose section for Gaia Blu metadata, organized around cruise resources that act as collectors for all campaign-related materials (cruise reports, CDI, data management plans, technical reports, etc.). The section is designed to create a complete inventory of Gaia Blu cruises.
  - Spatial Data section: this specialized catalogue handles geospatially referenced resources, which are automatically integrated into IT-IOOS to ensure unified discoverability across all Gaia Blu resources.

  Both catalogues assign persistent internal identifiers (handles) to all published resources, with the possibility to require an IT-IOOS DOIs. The IT-IOOS infrastructure and portal allow the publication and access to Gaia Blu catalogues, which will also be made traceable through other recognized external catalogues and repositories, while maintaining centralized availability through the cruise-based organizational structure.

  A persistent internal identifier (handles) is assigned to data, with the possibility to require an IT-IOOS DOIs. The IT-IOOS infrastructure and portal allow the publication and access to Gaia Blu catalogues, which will also be made traceable through other recognized external catalogues and repositories, while maintaining centralized availability through the cruise-based organizational structure. This approach ensures that all Gaia Blu research outputs —data and documentation—are findable and available within an integrated data management framework.

- **Accessible**

  Gaia Blu datasets are openly available by default, with exceptions only when specified in cruise-specific data management plans. All datasets are tracked through the Gaia Blu data portal. The primary data storage is the Gaia Blu data center, which provides raw data storage for both physical and digital data. After quality control and metadata, collected data is then made available via specialized repositories based on dataset characteristics, e.g. for spatial data: a standards-based infrastructure including GeoNetwork catalogue service, GeoServer repositories, ERDDAP, and THREDDS Data Server. The Gaia Blu cruise information and data are discoverable at different level:

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- Cruise-level: Each cruise resource is connected to all datasets from that specific campaign
- Dataset-level: Individual datasets are published with their own metadata, access links, and connections back to their parent cruise resource.

This structure creates a comprehensive, standards-based data ecosystem that maintains clear relationships between individual datasets and their originating research cruises while ensuring open access through multiple service pathways.

- **Interoperable**

Gaia Blu employs multiple standardized formats to ensure seamless data exchange and integration with broader research networks like EMODnet, IOOS, SeaDataNet, Eurofleet, … enabling integration into established oceanographic data ecosystems.

Implementation of multiple standard protocols (DCAT, OAI-PMH, REST API, OGC, ...) ensures that Gaia Blu data can be easily discovered, accessed, and integrated by various user communities and automated systems, promoting maximum data reusability and interoperability across different research platforms and initiatives.

This multi-standard approach ensures that Gaia Blu data can be easily discovered, accessed, and integrated by various user communities and automated systems, promoting maximum data reusability and interoperability across different research platforms and initiatives.

- **Reusable**

Cruise summary data will be accompanied by clear, standardized licenses that explicitly define permitted uses and reuse conditions, promoting maximum reusability while respecting data contributor rights. The license applied to overall cruise metadata operates independently from licenses governing individual datasets, with specific licensing determined through cruise-specific data management plans.

According to the Gaia Blu Data Policy, datasets may have embargo periods of up to 24 months maximum, though Principal Investigators are encouraged to minimize embargo duration to the shortest period necessary. Embargo periods and release schedules may vary per dataset, allowing flexible data release planning for different data types within a single cruise.

All licenses will clearly specify:

- Permitted uses (commercial, non-commercial, derivative works)
- Attribution requirements
- Any restrictions or conditions for reuse
- Contact information for data inquiries

This approach ensures that potential users can easily understand their rights and obligations, facilitate responsible data reuse while maintaining appropriate credit to data originators.

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5 Managing ship-time for a strategic vision to support marine science in Italy

Given its strategic importance, the allocation of ship-time aboard Gaia Blu must be carefully planned and managed to maximize scientific impact, foster national and international collaboration, and align with Italy's broader environmental and research policies. This chapter outlines the framework for the strategic allocation of ship-time, structured into three key components:

Component A: Prioritization of national and international strategic programs, including flagship initiatives such as the Italian National Recovery and Resilience Plan (PNRR), the Marine Strategy Framework and other European Union's Directives, and contributions to global observing systems like UNESCO's GOOS, GEBCO and GCOS. These programs address critical challenges such as climate change, biodiversity conservation, ocean exploration and sustainable management of marine ecosystems.

Component B: Competitive calls for curiosity-driven research and projects funded by European programs, ensuring openness to innovative scientific proposals and fostering excellence through transparent peer review processes.

Component C: The operational management of offshore infrastructures, integrating ship-time with the maintenance and enhancement of fixed marine observatories and autonomous platforms, in close connection with major European and international research infrastructures and initiatives with marine interests — such as EMSO, ICOS, ARGO, JERICO, EMBRC, EMODnet and the National Biodiversity Future Center (NBFC) — as well as Aquarius and the SBEP, and the International Seabed Authority. This integration ensures synergy between mobile and stationary assets for comprehensive marine monitoring.

This strategic allocation framework is designed to ensure that the R/V Gaia Blu's capabilities are used efficiently and transparently, supporting Italy's leadership in marine science while promoting open data sharing and international cooperation in line with FAIR principles.

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6 Ship-time access strategy for commercial and institutional users/stakeholders

Use of the R/V Gaia Blu for Third-Party Activities

The R/V Gaia Blu can be made available for third-party activities, meaning the execution of work commissioned by external clients with the direct involvement of specialized CNR personnel. In these cases, CNR staff participates in the execution of the project, operating under the supervision and on behalf of the institution.

This opportunity allows for an increase in the annual available budget, generating revenue that can be partially reinvested in minor maintenance, upgrades, or improvements of the vessel. Furthermore, a portion of the proceeds is allocated to the personnel involved, offering a concrete incentive for staff to participate for limited periods. (please refer to the new CNR third-party regulation)

CNR personnel selected for these activities are chosen based on the technical and scientific skills required for the specific task.

Evaluation and Approval Procedure

1. *Third-Party Work Request*
   The request must be submitted to the Technical Panel, the Infrastructure Manager, Research Infrastructure Office and the DSSTTA-CNR Director. These parties provide a prompt assessment regarding the feasibility of preparing a technical and financial offer. The offer is drawn up in coordination with the RUP based on the vessel's daily operating costs and personnel costs, in accordance with the CNR's third-party project budget framework.

2. *Internal Evaluation*
   - The Technical Coordination Panel assesses operational feasibility and acts as a technical liaison with the ship operator
   - The Access Group checks vessel availability and the possibility of scheduling the activity.
   - The Scientific Committee evaluates the strategic relevance of the proposed work in relation to the institution's objectives.
   - An internal evaluation period of no more than two weeks is required in order to provide a response that aligns with market timelines.

3. *Contract Formalization*
   Upon acceptance of the offer by the client, the CNR Legal Office is involved in drafting a dedicated contract, which includes the appointment of one or more scientific coordinators for the project and designated contract representatives.

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Appointment and Role of Scientific Coordinators

Scientific coordinators are appointed by the DSSTTA-CNR Director based on the specific expertise required by the project. They are responsible for:

- Overseeing the contractual and administrative process;
- Assembling and leading the operational team;
- Ensuring proper execution of activities and the achievement of project objectives.

7 Analysis of main results from each campaign and evaluation metrics

The R/V Gaia Blu represents a cornerstone infrastructure for marine science in Italy, enabling multidisciplinary investigations across oceanographic, geological, and environmental domains. Designed to support both national and international scientific communities, the vessel has facilitated and will facilitate a wide range of campaigns aimed at exploring and monitoring marine ecosystems, seafloor structures, and oceanographic processes. Below is a list of preliminary key indicators reflecting the scope and impact of its activities that eventually will be used to evaluate R/V Gaia Blu's performance and long-term value to the scientific community:

Campaign Metrics

- **Number of campaigns conducted:** Extensive series of missions across multiple years
- **Total days at sea:** Hundreds of navigation days logged
- **Average duration per campaign:** Typically ranging from several days to multiple weeks

Geographic and Operational Scope

- **Main working areas:** Strategic marine regions mapped and studied
- **Seafloor mapping**: Large-scale bathymetric surveys using multibeam and CHIRP systems
- **Sampling stations:** Numerous stations distributed geographically
  - **Sampling types:** Sediments, water, biota
  - **ROV dives:** High number of remotely operated vehicle operations
  - **Sediment cores:** Significant quantity and total length of cores collected

Scientific Personnel

- **Total embarked personnel:** Diverse teams per campaign
  - Senior researchers, Early Career Scientists, PhD students, technicians

Institutional Collaboration

- **Participating institutions and universities**: Broad network of national and international partners
- **Average number of partners per campaign:** Multi-institutional involvement

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Funding and Projects

- Sources of funding: European, national, international, and private
- Associated research projects: Numerous interdisciplinary initiatives

Scientific Themes and Research Areas

- Disciplines covered: Physical and chemical oceanography, Marine biology, Marine geology, Palaeoceanography, Geophysics, Bio-optics, Environmental monitoring
- ERC sectors addressed: Alignment with European Research Council thematic areas
- Oceanographic parameters measured: Temperature, salinity, pH, marine currents, biogeochemical tracers (e.g., chlorophyll, oxygen, nutrients, inherent optical properties, ecological variables, etc.

Scientific Output

- Publications: Peer-reviewed articles resulting from onboard research
- Conference contributions: Presentations and posters at international scientific meetings

Training and Education

- Onboard training: Programs for students and early-career researchers
- School engagement: Educational outreach and collaborations with schools

Outreach and Public Engagement

- Initiatives: Open ship events, livestreamed ROV dives, documentaries, TV and newspaper interviews, ship diaries, live connections between the ship and schools, Live connection with several cultural and scientific events.
- Data Management and Accessibility
  - FAIR datasets produced: Open-access data including atlases and calibration/validation datasets.
  - Support for monitoring programs: Contributions to national, European, and global initiatives.

8 Optimizing ship-time request procedures and scheduling

To ensure that the R/V Gaia Blu operates at its full scientific and strategic potential, it is essential to continuously improve and streamline the processes related to ship-time request, review, scheduling, and cruise implementation. Building on the existing access framework and evaluation criteria, further optimization will focus on improving user experience, enhancing transparency and traceability, and enabling multi-annual strategic planning.

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The following pillars will guide the optimization process:

8.1 Digitalization and adoption of Marine Facilities Planning software

In line with best practices adopted by leading European marine research institutions, the Marine Facilities Planning software (MFP, https://www.marinefacilitiesplanning.com) will be adopted as the main operational and scheduling platform. MFP will allow for:

- real-time visualization of the ship calendar and planning status;
- streamlined submission and tracking of cruise requests;
- digital cruise dossier management (scientific forms, permits, checklists, data policies);
- integration with logistics workflows and onboard operations.

This transition will enhance transparency and reduce administrative workload for both applicants and infrastructure managers.

8.2 Integration of biennial planning

To support long-term scientific programs and strategic initiatives, as well as to allow for diplomatic clearance applications for marine research to coastal states, R/V Gaia Blu scheduling will be structured around biennial calls and planning cycles. This model will ensure predictability for coordinated observational programs.

8.3 Improved pre-cruise coordination and operational readiness

To enhance cruise preparedness and minimize risk of delays or cancellations, optimized procedures will include:

- early-stage technical feasibility checks by infrastructure manager and logistical working group;
- mandatory pre-cruise logistics meetings using shared digital templates (PEP, Risk Plan, DMP, Operations Manual);
- cruise-specific documentation versioned and stored on the MFP platform;
- structured integration of safety, certification and training requirements (STCW, medical fitness, etc.).

8.4 Centralized monitoring and performance tracking

The MFP platform will also support centralized tracking of cruise progress, user satisfaction, deliverables, and follow-up obligations (cruise reports, DMPs, publications, dataset deposition). These outputs will feed into an annual evaluation of the ship performances, coordinated by the strategic oversight commission and the advisory board. Key performance indicators (KPIs) will include:

- number and diversity of scientific missions supported;
- geographical and disciplinary coverage;
- ratio of requested vs. executed cruise days;
- cruise-to-output metrics (datasets, publications, policy contribution).

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9 Public engagement and dissemination

The R/V Gaia Blu stands out also for its strong commitment to public engagement and dissemination of the outcomes of oceanographic campaigns. One of the strategic goals of the infrastructure is to stimulate public awareness of marine and environmental issues, transferring knowledge and the impacts of research to civil society, stakeholders, and institutions.

The Communication and Outreach Working Group plays a pivotal role in this process. Its activities include the integrated management of outreach events during port calls and the promotion of digital connections during operations at sea. This is carried out in constant collaboration with the CNR Press Office and the Communication Unit to ensure maximum visibility for shipboard activities, through integrated production of audiovisual materials, documentaries, and promotional videos—as well as curating a dedicated webpage on the CNR portal.

Scientific teams, already in the application phase for ship use, are to indicate all possible engagement and dissemination initiatives linked to the expedition. Before each campaign begins, the Principal Investigator or Chief Scientist draft a public-oriented note, presenting the funding project, the institutions involved, planned activities, and the potential social and environmental impacts. This note, enriched with images and multimedia content chosen according to specific guidelines, is elaborated by the Press Office and communication managers, who adapt and disseminate it on all of the institution digital channels.

In the absence of dedicated communication staff on board, researchers are encouraged to document scientific activities and life aboard the ship through photos and videos, sharing all multimedia content via the Communication and Outreach Working Group's OneDrive folder, which ensures structured collection and access to produce scientific communication and outreach. Upon request to CNR Press Office, collaborations can be activated with broadcast journalists and communication professionals to amplify the reach of events and campaigns, including live connections on institutional social media. All outreach activities and audio/video content must follow the communication and scientific dissemination guidelines, with required use of Gaia Blu and CNR branded clothing.

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10 Strategic framework for the scientific use of the R/V Gaia Blu

Although owned and managed by CNR, the R/V Gaia Blu is supported through additional FOE (*Ordinary Fund for Research Bodies*) funding and serves the broader national research community. To ensure that ship time is used coherently and with maximum scientific impact, every other year the DSSTTA-CNR and the marine institutes will develop a strategic framework for planning, evaluating, and allocating ship time. This framework ensures alignment with national scientific priorities, responsiveness to European research strategies, and continued openness to bottom-up scientific innovation.

Until the call for proposals launched in September 2025, proposals have been assessed on scientific merit and feasibility, and awarded ship time based on priority. This approach has enabled broad participation and representation of the national marine science community. However, some structural limitations have emerged:

- lack of a long-term strategic trajectory: proposals reflect individual research agendas but do not necessarily align with national medium- to long-term priorities;
- uncertainty about large strategic projects: requests linked to major national initiatives (e.g., NBFC, MED-IN-DEPTH, PNRR projects) compete in the same pool with smaller curiosity-driven proposals, complicating prioritization.

A more structured, transparent, and strategic framework is therefore required.

10.2 Guiding principles for a strategic ship-time framework

Although supported by additional FOE funding, the R/V Gaia Blu has been acquired through CNR funds, is managed by CNR technical staff, and its maintenance and upgrades are fully supported through CNR resources. A significant part of the scientific instrumentation permanently installed on board the vessel has been proposed, selected and acquired through and by CNR's resources and researchers, some of which have responsibility for the on-board instrumentation.

This situation reinforces the CNR's central role in defining access guidelines and ship-use strategies.

Every two years, CNR will publish a strategic framework document on national priorities and trajectories in marine research, developed by the DSSTTA-CNR and the marine institutes, with input from external experts and in line with the vision shared by the Scientific Committee.

This document will:

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- reflect national priorities while remaining aligned with major European frameworks (e.g., Ocean Pact, EU Ocean Observation Strategy, Research & Innovation strategies, ESFRI, and major international marine initiatives);
- be sufficiently broad and bottom-up informed to avoid creating rigid or unrealistic thematic constraints;
- ensure that the strategic directions naturally emerge from the ongoing research activity of the Italian community.

The strategic framework will become the reference for the use and allocation of the R/V Gaia Blu ship time.

10.3 Distribution of ship time

The FOE covers a large number of ship-days per year. The proposed allocation model is:

- up to 80% of FOE-funded ship time dedicated to projects aligned with the strategic framework. This ensures continuity, coherence, and cumulative impact across marine research domains (physical and biogeochemical oceanography, marine ecology, deep-sea ecosystems, marine geology, technology development, and others).
- At least 20% of FOE-funded ship time allocated to other research, preserving openness to innovative and high-risk concepts and curiosity-driven research, with priority given to activities supported by international strategic projects relevant for Italy.

The total distribution does not require separate calls or sub-calls. A single call will be issued, in which proponents simply indicate whether their proposal is aligned with one or more lines of the strategic framework or not. Ship days funded by third-party contracts or major national projects remain outside the FOE allocation, however their selection and execution will be prioritized based on their alignment and consistency with the strategic framework. The Access Working Group will maintain flexibility to employ both "time blocks" to fill the annual schedule, ensuring full usage of available days while maintaining scientific quality and strategic coherence.

10.4 Rationale and expected benefits

This scheme ensures:

- broad and balanced coverage of scientific themes across the marine research spectrum;
- a clear, long-term strategic trajectory that strengthens Italy's position in European and international marine research;
- coherence between bottom-up proposals and national strategic needs, avoiding the risk of misalignment between community research directions and policy expectations;
- space for exploratory, innovative research, which is essential for scientific advancement;
- a structured pathway for large national and international initiatives to access ship time coherently;

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- a strengthened national system for marine exploration, improving Italy's capacity to contribute to global observing networks, deep-sea research, and ocean-climate understanding.

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11 Reference documents

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