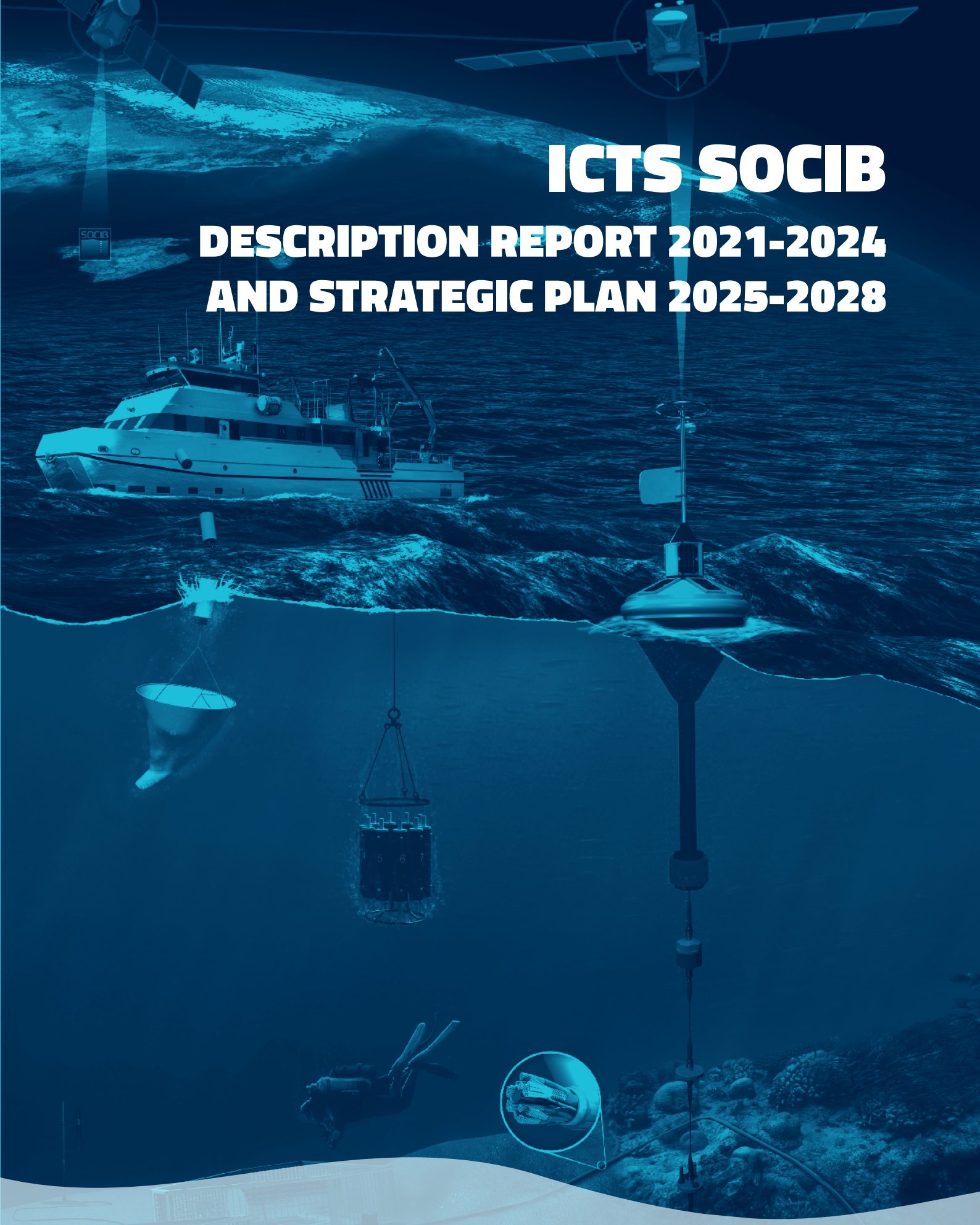
ICTS SOCIB

DESCRIPTION REPORT 2021-2024
AND STRATEGIC PLAN 2025-2028



SOCIB Balearic Islands Coastal Observing and Forecasting System

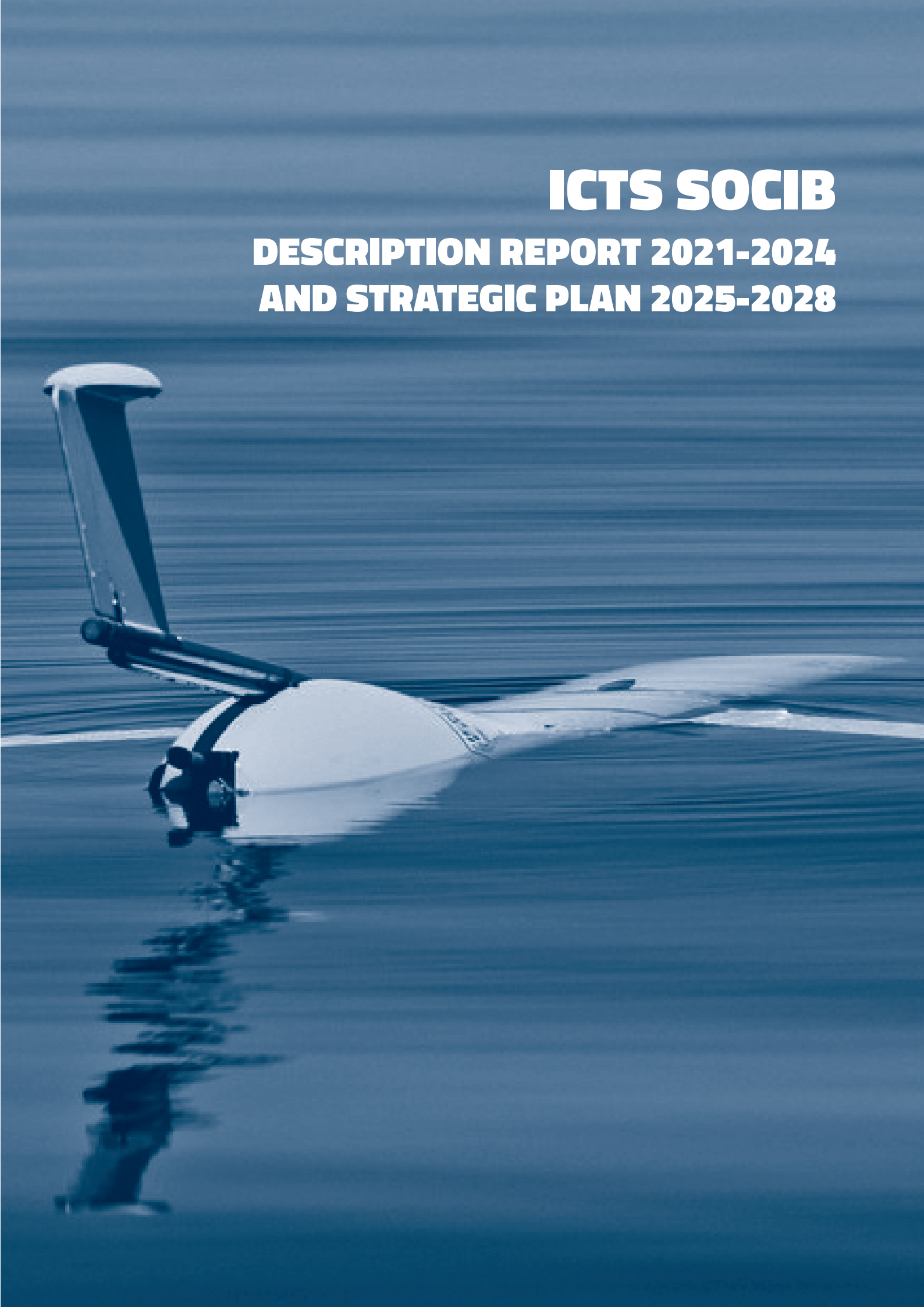
MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES

CSIC

Govern de les Illes Balears

ICTS SOCIB

DESCRIPTION REPORT 2021-2024 AND STRATEGIC PLAN 2025-2028



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This document compiles all the necessary information for the evaluation of SOCIB in the ICTS MAP 2025-2028 update process, as established by the Consejo de Política Científica, Tecnológica y de Innovación (CPCTI) on November 7, 2024.

The Comité Asesor de Infraestructuras Singulares (CAIS), with the support of the Agencia Estatal de Investigación (AEI) and the Ministerio de Ciencia, Innovación y Universidades (MICIU), conducts a scientific and technological evaluation every four years to assess the merits and results of all Singular Scientific and Technical Infrastructures (ICTS). This evaluation determines whether infrastructures meet the necessary ICTS requirements for continued inclusion in the ICTS MAP, while also identifying potential improvements or conditions for their continuity.

As a unique-location ICTS, SOCIB must submit the required documentation, ensuring its alignment with national and European research priorities. The final configuration of the ICTS MAP 2025-2028 will be approved by the CPCTI, defining investment priorities and the strategic development of research infrastructures in Spain.

This document is structured into several key sections following the indications received from the Ministry of Science, Innovation and Universities (MICIU) and provides a comprehensive overview of SOCIB's evaluation::

- **Description Report of the ICTS SOCIB 2021-2024**, highlighting its uniqueness, strategic relevance, governance model, and open-access policies.
- **Strategic Plan 2025-2028**, outlining SOCIB's mission, vision, objectives, and implementation strategies, along with a SWOT analysis and a structured follow-up plan.
- **Investment Plan**, detailing financial projections and the expected impact of future investments.
- **STAC Report Summary**: Scientific and Technical Advisory Committee assessment, Providing an overview of the key observations and recommendations from the Scientific and Technical Advisory Committee (STAC), based on its independent assessment of SOCIB's scientific strategy and future vision.
- **Annexes**, which include essential supporting documents such as the evaluation by CAIS, agreed upon in the 2021 ICTS MAP update process, an analysis of the compliance with the 2021-2024 Strategic Plan, key performance metrics, and a summary of the participatory process carried out for the development of the new 2025-2028 Strategic Plan.


iRobot

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DESCRIPTION REPORT

1.1. GENERAL DESCRIPTION OF THE ICTS SOCIB

1.1.1. ICTS SOCIB overview

The Coastal Observing and Forecasting System of the Balearic Islands (SOCIB), located in Palma, is a scientific and technical infrastructure established in 2007 and included in the Map of Unique Scientific and Technical Infrastructures (ICTS) since 2014. SOCIB is a public consortium involving the Ministry of Science, Innovation and Universities, the Autonomous Community of the Balearic Islands, and the National Research Council.

SOCIB operates a multi-platform observing and forecasting system that continuously monitors the western Mediterranean, from the nearshore to the open sea. The SOCIB **multi-platform observing system** responds to a multi scale approach and collects met-ocean data through High-Frequency Radars, Beach Monitoring Systems, Gliders, drifting buoys and profiling floats, oceanographic buoys, meteorological, coastal and sea level stations, and the research vessel R/V SOCIB. Moreover, it operates a **forecasting system** that provides predictions on currents, waves, as well as meteotsunamis. The met-ocean data generated from SOCIB RI System, which is SOCIB's Outstanding Facility as detailed in section 1.1.3, are essential for marine and coastal research and are openly accessible in real time through the **Metocean Data Repository**.

The data repository provides integrated historical, real-time, and forecast data on Essential Ocean Variables (EOVs), including physical, biogeochemical, and meteorological parameters. It adheres to international data management standards and was awarded **CoreTrustSeal** certification in 2022. Users can access the data via the SOCIB Data Catalog, API, and THREDDS Data Server. As an ICTS, SOCIB also provides competitive access to the R/V SOCIB and the Glider Fleet, supporting advanced oceanographic research.

By the end of 2024, SOCIB expanded its capabilities with a Satellite Facility, enhancing its ability to acquire, process, and distribute satellite-derived oceanographic data.

Main Research Areas: SOCIB infrastructures contribute to advance research and technologies predominantly related to the following three research areas that are well aligned with international, EU and Spanish state of the art priorities and frameworks, as detailed in section 2.2:

> **Ocean and coastal variability:** Investigating the state and variability of the ocean across different spatial-temporal scales, employing a multidisciplinary approach, as well as the ocean's role in climate.

- **Climate change impacts and ocean health:** Evaluating the impact of climate change, extreme events, and other human pressures on the coast and contributing to better understanding of the state and health of marine ecosystems and resources.
- **Operational response and early warning systems:** Emphasizing the use of real-time metocean data, developing and utilising predictive models to support sustainable resource management, maritime operations, and emergency response.

Strategic Users and Key Sectors at SOCIB: As detailed in the document Knowledge Transfer in the ICTS SOCIB[1], the Strategic Users presented below refer to the diverse groups that utilize the products, services, facilities, data, technologies, or knowledge generated by the ICTS for various purposes:

- **Academic and Scientific Community:** Researchers, academics, and scientific teams leveraging SOCIB's resources for advancing research and innovation (e.g., University of Balearic Islands (UIB), Mediterranean Institute for Advanced Studies (IMEDEA (CSIC-UIB)), Marine Technology Unit (UTM-CSIC), Spanish Institute of Oceanography (IEO-CSIC), Andalusian Institute of Marine Sciences (ICMAN-CSIC, among others).
- **Business and Industry:** Companies and organizations using SOCIB's data, technologies, and services for innovation, product development, and decision-making (e.g., Hotel chains as Melia or Iberostar, Balearic Association of Nautical Clubs, Maritime and Nautical Associations, etc.).
- **Public Administration and Governance:** Government institutions and agencies employing SOCIB's data for policymaking, resource management, and urban planning (e.g., Spanish National Port Administration, Spanish Maritime Safety and Rescue Agency, Directorate-General for Circular Economy, Ecological Transition, and Climate Change of the Balearic Islands Government, among others).
- **Educational Community:** Schools, universities, and training centers using SOCIB's resources to enhance learning, promote scientific literacy, and foster ocean literacy (e.g., schools and high schools in the Balearic Islands, Directorate-General for Universities, Research, and Higher Artistic Education of the Balearic Islands Government, etc.).
- **General Public:** Citizens benefiting from SOCIB's open access to information, education, and outreach activities, enabling informed decision-making and participation in public discourse (e.g., Spanish Foundation for Science and Technology (FECYT), Research Vessel Open Days, CoastSnap citizen science, Group for Ornithology and Nature Conservation (GOB), Association of Neighbors of Son Carrió, among others).
- **Media:** Includes journalistic organizations, news agencies, and multimedia platforms that use data and information services to inform the public, promote transparency, and foster cultural, social, and economic development through the dissemination of accurate and timely information (e.g., EFE Agency, National Geographic Spain, RTVE, local and regional newspapers, etc.).

Strategic sectors represent **key areas of interest** that rely on SOCIB's data, services, and expertise for their activities, innovation, competitiveness, or policy development:

- **Science and Innovation:** Researchers and innovation centers using SOCIB's data and services for scientific and technological advancements.

1. Rodríguez, R., Gómez, A. G., Juza, M., Ortiz, V., Ribot, L., García-Carballo, N., & Tintoré, J. (2024). La Transferencia de Conocimiento en la ICTS SOCIB [Report]. ICTS SOCIB. 10.25704/8m90-4082

- **Coastal Communities, Beaches, and Tourism:** Authorities, local governments, and tourism organizations managing coastal resources and promoting sustainable tourism.
- **Ocean and Coastal Governance:** National and international marine agencies utilizing SOCIB's data for planning and sustainable management.
- **Marine Conservation and Sustainable Ecosystems:** Environmental organizations and NGOs using SOCIB's knowledge for biodiversity conservation and habitat protection.
- **Maritime Trade and Navigation:** Shipping and maritime industries leveraging SOCIB's data for fleet management, route optimization, and maritime safety.
- **Extreme Events and Security:** Emergency response agencies and security institutions using SOCIB's data for risk prevention and disaster management.
- **Climate and Adaptation:** Governmental and research institutions studying climate impacts and developing adaptation strategies.
- **Ocean Health:** Research organizations monitoring ocean health and assessing its environmental impacts.
- **Ocean Prediction:** Meteorological agencies and research centers utilizing SOCIB's data for forecasting oceanic and weather conditions.
- **Education, Public Engagement, and Ocean Literacy:** Schools, NGOs, and cultural organizations using SOCIB's resources for education, environmental awareness, and ocean culture promotion.

Five Major Highlights of Progress: In the 2021-2024 period since its last evaluation, SOCIB has made significant strides and 5 major key highlights have been identified:

- **Structural Reinforcement:** the formal entrance of CSIC to SOCIB, joining the Consortium in 2021 and co-funding the new building in the harbor of Palma[2] implied a recognition of SOCIB scientific and technical strategy, activities and challenges[3] and provided an essential step towards enhanced integration with CSIC ocean observing & predicting capabilities.
- **Long-term (10 years) Sustainability:** the entry into force of the new agreement between the Ministry, CSIC, and the Balearic Government for a 10 year period, 2024-2033, and with a €93.36 million Euros funding, allows for infrastructure replacement and update[4], personnel stabilization and focus on major international challenges aiming at contributing to the digital twins of the ocean.
- **Access to Infrastructures:** the competitive and under-request enhanced use of the SOCIB infrastructures and the collaborations therein established (among others, US ONR Calypso, EU projects, ICTS Laboratorio Subterráneo de Canfranc, and/or LIFE-Cala Millor Project) have contributed to enhance SOCIB scientific outcomes, transfer of knowledge and innovation, supporting public policies with significant impact on society and recognition.
- **Building Trust:** SOCIB leitmotiv, "Scientific Excellence with Impact on Society", which is inserted into our DNA since its origin has been reinforced in the last 4 years where we have perceived that we have been able to build trust with stakeholders and collaborating organizations at global, regional or local scale. This is a major step forward and a recognition of the SOCIB approach.

2. 3.722 m², and a €7.5 million investment by CSIC, MICIU and CSIC, co-financed through the EU's FEDER program.

3. as addressed by the Vice-president of Science and Technology of CSIC in the Board of Trustees where the inclusion of CSIC was formally endorsed, in November 2020.

4. Approximately more than 13,5 MEuros of scientific equipment installed at sea are already depreciated, being more than 10 years old.

> **Data:** free and open data policies for SOCIB infrastructures have now reached an international recognition with the Core Trust Seal recognition and the quantitative enhancement of the data FAIRness[5].

For a more comprehensive understanding of SOCIB's progress and achievements, please consult the **Annex 2. Compliance of Strategic Plan 2021-2024**.

Mission, Vision, Strategy, Objectives, and Values

SOCIB operates based on a mission, vision, objectives, and values that emphasize its role in providing ocean observing and forecasting systems, supporting scientific research, and facilitating sustainable management of marine and coastal resources in the Western Mediterranean.

MISSION

SOCIB's mission is to operate an observing and forecasting system in the Western Mediterranean and to provide data, facilities, services, and digital tools to advance the understanding of the ocean and transfer knowledge to society.

VISION

SOCIB's vision is to establish itself as a leading research infrastructure in the field of marine R&D&I and to contribute to the development of a digital twin in the Mediterranean to support decision-making in the context of climate change.

STRATEGY

The SOCIB strategy for 2025-2028 leverages the Digital Twin of the Ocean (DTO) as a focal point to align the goals of SOCIB, creating synergies that enhance efficiency and output across the organization. This strategy establishes the framework for SOCIB's activities, including the launch of a new unique infrastructure, SOCIB 2030 Digital Twins Outstanding Facility, and is aligned with the mission, vision, values, and objectives. The detailed plan, outlined in the following sections, responds to this strategy.

The SOCIB strategy therefore focuses on:

> **Maintaining and improving operational effectiveness** across its various components (a necessary but not sufficient condition).

> **Strengthening existing unique elements that provide added value, making SOCIB distinctive** and implementing new ones as needed, to ensure SOCIB advances on the Digital Twins of the Ocean challenges. This approach addresses both scientific priorities and societal needs while acknowledging that the Digital Twins of the Ocean framework is undoubtedly a VUCA (Volatile, Uncertain, Complex, and Ambiguous) environment.

As a way to enforce the above Strategy, the following principles have been established:

Underlying Principles or Driving Forces for 2025-2028 Strategic Plan:

> **Access:** Enhancing access to SOCIB's infrastructures and data, designing and when appropriate implementing competitive open access systems for SOCIB infrastructures, ensuring alignment with international data valorization systems, co-existing with the goal of maintaining and improving external and virtual access in the national and international landscape.

5. using for example the FAIR EVA (Evaluator, Validator, Advisor) from Digital CSIC.

- **Data, Digital and Organizational Transformation:** incorporation of AI into all SOCIB activities (with intelligence, curiosity, and a critical mindset!), based on reliable data (enhancing best practices) and advancing in organizational changes, aligned with the requested international transformation and integration in oceanography (no silos), calling therefore for well-defined, symbiotic and effective scientific, technical, and administrative coordination, both internally and externally. Data, digital and organizational transformation are key founding elements needed to address the digital twins of the ocean.
- **Innovation and Fit for Purpose Solutions:** the international digital twins of the ocean challenges imply the development of know-how and solutions tailored to well identified stakeholders needs and specific requirements. The PRFAQ working backwards methodology (from the end user experience) that has been tested in 2024 will be adopted across all SOCIB actions and embraced by all personnel, by this assuring effective innovation and fit for purpose solutions.
- **International Partnerships:** maintaining partnerships (more than collaboration!) at the level of Copernicus Marine Service, EMODnet, Digital Twin of the Ocean, DITTO, the European Data Strategy, EOSC, etc., and development of new structural ones (such as entering the new Mercator Ocean International) is essential to respond to worldwide challenges and long term sustainability.
- **Academia:** Establishing an internal training system linked to the Universitat de les Illes Balears and open to other key universities and academic actors. More than training, since we envision also onboarding new personnel, talent attraction, career development, making SOCIB an attractive environment to work, etc.

OBJECTIVES

The objectives of ICTS SOCIB, in order to promote its mission and achieve its vision, are:

- **To operate an observing and forecasting system in the Western Mediterranean:** we operate a multiplatform observation system, collecting metocean data from the coast to the open sea, and a forecasting system for oceanography, waves, and meteotsunamis.
- **To provide access to facilities and data:** we offer open access to our near real-time metocean data, as well as historical data, and provide access to our state-of-the-art facilities, such as underwater gliders and the oceanographic vessel.
- **To contribute to scientific research:** we support research, and also lead and collaborate on research projects, contributing to the advancement of scientific knowledge on key ocean issues, in response to international priorities and societal needs.
- **To transfer knowledge:** we transfer knowledge through the development of applications, training, scientific communication, and the promotion of ocean literacy, establishing bidirectional and ongoing cooperative links between science, public administration, the business sector, and the educational community.

For more information about our activities, values, and mission, please visit the **"Who We Are"** section on the SOCIB corporate website.

ICTS SOCIB outstanding facility

The **outstanding facility is the SOCIB Research Infrastructure (RI) System** (since CAIS evaluation received in 03/2022) which offers open access to the data collected by the ICTS's multi-platform observing and forecasting system through its Metocean Data Repository. This system integrates a

diverse range of instruments and sensors to continuously monitor and forecast coastal and oceanic processes in the Western Mediterranean Sea. This multi-platform system enables the collection and prediction of multidisciplinary and multi-scale metocean data, which are essential for understanding the state and variability of the ocean and the coastal zone across different scales, improving the accuracy of short term response and climate scenario prediction, and facilitating science-based decision-making for the sustainable management of marine and coastal resources. Here we present a detailed description of the **infrastructure operated** and the **data provided by each platform**, along with their purpose, applications, technical features and scientific performance.

High-Frequency Radar Facility: This facility operates 2 High-Frequency Radar (HFR) stations in the Ibiza Channel. This platform provides hourly measurements of high-resolution surface marine currents (3 km resolution) in an area of up to 65 km from the coast. The high real-time availability and the fact that the spatio-temporal resolution of the surface current maps is equivalent to that of regional models enhance their use for the operational validation of ocean models and for model assimilation, of the highest importance for key end-users such as SASEMAR.

Beach Monitoring Facility: This Facility operates a Modular Beach Integral Monitoring System (MOBIMS), that integrates data from hybrid field surveys and remote sensing systems to monitor and characterize coastal processes. It comprises a low-cost, open-source video monitoring system (SIRENA), Acoustic Wave and Current Profilers (AWAC), meteorological stations, and bi-annual high-resolution bathymetric and topographic surveys, along with sediment granulometry. MOBIMS gathers data on shoreline measurements, sediment granulometry, wave and current dynamics, as well as meteorological data to study physical processes related to beach erosion, sediment transport, wave effects and trends of morphodynamic variability in some beaches of the Balearic Islands.

Gliders Facility: This facility operates a fleet of 7 gliders (or underwater drones), which are autonomous vehicles about 2 meters long and weighing 60 kilograms. The gliders are equipped with a set of sensors capable of continuously measuring Essential Ocean Variables from the surface to depths of up to 1,000 meters: temperature, conductivity, fluorescence, chlorophyll, oxygen, and turbidity. These data help understand physical and biogeochemical processes at different spatial and temporal scales and provide essential data for model validation and data assimilation.

Lagrangian Platforms Facility: This facility operates different types of surface drifters (CODE/DAVIS, CARTHE, ODi, HEREON, etc.) and subsurface drifters (SVP and SVP-B, from the NOAA Global Drifter Program), as well as autonomous profiling floats (Argo observation program). These drifters float and drift with ocean currents and provide data on current dynamics (through their trajectories) as well as seawater temperature and atmospheric pressure. Argo profilers provide vertical profiles of temperature and salinity down to a depth of 2,000 meters. All of this data are crucial for ocean models, enabling a quantitative characterization of water masses and the identification of ocean variability patterns in the ocean across different timescales.

Fixed Stations Facility: This Facility operates permanently installed stations of different types: sea level stations, coastal stations, oceanographic buoys and weather stations. These stations measure key meteorological parameters, including atmospheric pressure, air temperature, relative humidity, wind direction, and wind speed, as well as oceanographic parameters, such as sea level, water column currents, water temperature, and wave characteristics. These long-term datasets are essential for studying the variability of physical, chemical, and biological processes in coastal areas. Additionally, they support the analysis of past events and enhance predictive modeling capabilities.

Research Vessel Facility: This facility operates the SOCIB Research Vessel R/V, which is a catamaran specially designed for conducting oceanographic studies in the Mediterranean. With a length of 24 meters, it is equipped with the latest technological advances to collect multidisciplinary data, both in open sea and coastal areas: CTD, ADCP, thermosalinograph, rosette sampler and meteoro-

logical station. All these instruments provide vertical profiles of different types of data: seawater temperature, salinity, oxygen, turbidity, chlorophyll, ocean currents as well as meteorological data.

Modelling and Forecasting Facility: This facility operates three forecast models: i) The WMOP (Western Mediterranean Operational Model), in collaboration with AEMET, offers high-resolution (2.2 km, 1 hour) 3-day forecast of seawater temperature, salinity, sea level, and currents in the Western Mediterranean Sea; ii) The SAPO (Autonomous Wave Forecasting System) is a 72-hour forecasting service operated in collaboration with Puertos del Estado that provide forecast on wave height, period, and direction, around the Balearic Islands, from deep to shallow waters, with a resolution of 0.5 km; and iii) the BRIFS (Balearic RIssaga Forecasting System) is a meteotsunami (or "rissagues") forecasting system, developed in collaboration with AEMET and PortsIB, that forecasts the generation of meteotsunamis in the Port of Ciutadella (Menorca, Spain).

These facilities, all together, provide integrated multidisciplinary historical, real-time and forecast metocean data that are made openly accessible to the users through the ICTS SOCIB Metocean Data Repository. This Data Repository follows the highest international standards in data discoverability and reliability, ensuring data are FAIR (Findable, Accessible, Interoperable and Reusable). The CoreTrustSeal certification awarded in 2022 guarantees the trustworthiness and FAIRness of the SOCIB Data Repository, in alignment with ICTS SOCIB's Open Science Policy (see Data Usage Terms and Data Management). Information on the different ways to access this Data Repository can be found in section 2.4.

New outstanding facilities

Following the previous CAIS evaluation (from March 11, 2022), the Glider Fleet was recognized as an important facility within the ICTS SOCIB for the 2021–2024 period, and the SOCIB Data Repository was recognised as an outstanding facility.

Therefore, following the suggestion from the CAIS Evaluation, and **in order to reinstate the Glider Facility as an Outstanding Facility**, SOCIB made a substantial effort in 2022-2024 to improve its Competitive Open Access to its Glider Fleet in order to meet the required 20% threshold. Consequently the Competitive Open Access Protocol has been strengthened, describing the mechanisms and criteria for obtaining access to this facility. Moreover, a dedicated Open Access Glider Section has been created on the new SOCIB corporate website, which provides clear guidelines for researchers applying for access. To submit a request under this type of access, a Competitive Open Access Call must be available. Proposals submitted undergo a technical feasibility evaluation from SOCIB's technical team. Subsequently, the External Access Committee assesses and prioritizes them based on criteria of scientific and technical excellence. More information on the open access protocol can be found in section 2.4.

As a result of these efforts, the ICTS SOCIB achieved significant progress, allocating 24% of its total capacity to Competitive Open Access (COA) projects in 2024. It is important to note that before the evaluation received in 2022 (in relation to the previous evaluation in 2018), the calls related to European projects, specifically Transnational Access (TA) calls, were considered as COA before 2022 and CRA ("Competitive Restricted Access") after. This change of criteria for EU funded Competitive Access through TA not being recognised at national Spanish level was identified in the 2022 evaluation by CAIS and was related to the footnote N° 28 in Annex D of the "Agreement of the council for scientific, technological and innovation policy on the update of the map of unique scientific and technical infrastructures" from January 19, 2022. Footnote 28 indicates that since Spanish Researchers cannot access EU TA calls, TA Access should not be considered Competitive Access in Spain). We would like to respectfully request a revision of this consideration and the elimination of this footnote 28, to better align Spanish ICTS Strategies and Evaluation with the European Com-

mission, which explicitly states that its TA Calls to Research Infrastructures (RIs) are intended to promote open access and fill gaps in the distribution of access to RIs across Europe. In other words, we firmly believe and request that since TA Access is the EU Competitive Access Framework, the accesses by EU researchers to the SOCIB glider fleet should be also considered as contributing to the Spanish ICTS System Competitive Access.

In any case, since early 2022, upon reception of the evaluation from CAIS, SOCIB is working to align access to the glider fleet with ICTS criteria by actively encouraging the technological and scientific community to utilize its resources through Competitive Open Access calls. Thanks to this effort, the ICTS SOCIB has gradually improved the allocation of its glider fleet in Competitive Open Access during the 2021-2024 period, and is fully prepared to provide the Glider Fleet in competitive access for 2025-2028. This initiative highlights SOCIB's commitment to providing valuable research opportunities to the scientific community. Restoring this status would further strengthen ICTS SOCIB's leadership in ocean observation, scientific innovation, and the sustainable management of marine resources. Please see **2.8. New outstanding facilities proposal** for more detailed information.

A similar process will be conducted during the 2025-2028 period for improving the Competitive Open Access to the **SOCIB Research Vessel** and for its reinstatement as an outstanding facility (see A.3.2.2. Design future open access to SOCIB Research Vessel). Additionally, the other facilities will also explore ways to provide competitive open access to their infrastructures, beyond offering their data through the Data Repository (see A.3.2.3. Structuring and improving competitive access to SOCIB's facilities and services). Furthermore, the digital twins currently under development could potentially be proposed as outstanding facilities in the next period.

Complementary facility: the Satellite Facility

By the end of 2024, SOCIB has established the Satellite Facility. This Facility allows for systematic and long-term monitoring of the coastal-to-ocean system, enabling the provision of essential ocean variables (sea surface temperature, salinity, ocean color, sea level, surface currents, and winds) and key ocean indicators (marine heatwaves) from high-resolution satellite products from the Copernicus Marine Service. Combining satellite products with multi-platform observations and models, the Facility also develops applications that provide continuous and timely information on the ocean state, variability, and changes—ranging from extreme events to long-term trends over decades. Furthermore, the integration of additional satellite missions imagery (Sentinel, Landsat, PlanetScope) derived products is underway to monitor regionally relevant variables around the coastal areas of the Balearic Islands, such as water quality, bathymetry, and seagrass meadows. The Satellite Facility enhances the monitoring, visualization, and understanding of the ocean, contributing to regional digital twin prototypes and the development of evidence-based solutions for climate change impact monitoring.

1.1.2. Relational analysis and competitive advantages

SOCIB stands out as a robust multi-platform Coastal Ocean Observing and Forecasting Research Infrastructure with more than 10 years in the ICTS map, uniquely positioned to complement and integrate with similar and complementary infrastructures both nationally and internationally. Its singularities (integration of multi-platform observing, forecasting, data and society response), advanced capabilities, multidisciplinary approach, and strategic collaborations offer distinctive competitive advantages that contribute to the advancement of ocean science and sustainable management.

SOCIB's regional and national leadership in ocean observation, prediction, and ocean literacy: SOCIB has established itself as a leader in the Western Mediterranean, excelling in operational ocean observing and forecasting systems. Its alignment with European Union research frameworks (Horizon 2020, Horizon Europe and historical FPs) demonstrates its strategic adaptability and ability to address regional and global (GOOS) priorities. SOCIB's leadership team has successfully leveraged its resources through AGILE management strategies, ensuring operational efficiency and maximizing impact despite its comparatively smaller size. This efficiency positions SOCIB as a key contributor to Spain's research ecosystem, enhancing its relevance within the broader national ICTS framework.

National complementarity: Building on its national contributions, SOCIB plays a complementary role to the ICTS Oceanic Platform of the Canary Islands (PLOCAN) and UTM/CSIC and also Spanish Institute IEO-CSIC, research vessels and data capabilities. While PLOCAN provides expertise in offshore technology testing and IEO-CSIC focuses on marine biodiversity and fisheries, SOCIB's strengths lie in its comprehensive multi-platform observing and forecasting systems, designed to monitor and model the Mediterranean's dynamic coastal and open ocean environments. SOCIB's observing and forecasting platforms provide unparalleled capabilities for understanding processes ranging from coastal erosion to large-scale ocean circulation. This specialization enables SOCIB to enhance national efforts and increase competitiveness, offering know-how, data and services that other infrastructures can integrate into broader research initiatives.

European Union funding and strategic importance: Building on its strong foundation at the national level, SOCIB has leveraged European Union funding to enhance its infrastructure and foster collaborations with other leading marine research centres. By aligning with EU priorities such as the European Green Deal and the Marine Strategy Framework Directive, SOCIB showcases its capacity to achieve impactful outcomes that address climate resilience and sustainable marine management. Its commitment to open science and adherence to internationally recognized standards further solidify SOCIB's position as a global leader in marine data services, earning recognition through initiatives such as the CoreTrustSeal certification.

Financial sustainability, supporting RI activities and next-decade challenges: At the national level, SOCIB continues to consolidate its role as a key marine research infrastructure, securing strategic investments that enhance its capabilities and long-term sustainability. A major milestone in this regard is the signature of the III Addendum to the SOCIB Agreement, which has secured €93.36 million for the development of the "Digital Twin of the Mediterranean" facility over a 10 years time frame. This initiative will integrate real-time and historical data to enhance predictive modeling and support sustainable ocean management, reinforcing SOCIB's leadership in marine research and technological innovation.

SOCIB's competitive advantages: SOCIB's competitive advantages are evident across multiple dimensions:

> **Integrated multiplatform observing system:** SOCIB provides a holistic view of the marine environment by combining diverse platforms such as gliders, high-frequency radars, fixed stations, beach monitoring, lagrangian platforms and satellite data. This integration supports high-resolution and real-time monitoring from the near-shore to the open sea, filling critical data gaps in the Mediterranean.

> **Advanced forecasting models:** SOCIB's numerical models, including the Western Mediterranean Operational Model (WMOP), the wave model (SAPO) and specialized early warning systems like BRIFS for meteotsunami forecasting, are tailored to regional needs. These tools provide decision-makers with actionable insights for managing climate impacts, extreme events, and coastal adaptation planning.

- **Digital Twin Ocean (DTO):** SOCIB's observing and forecasting systems, data management capabilities and outreach and knowledge transfer experience, are vital to the development of the Digital Twin Ocean initiative. SOCIB 2030 will develop high-precision digital representations of specific areas of the Balearic Sea, integrating data and models with AI to monitor, simulate and predict ocean processes and human impact. The goal is to support real-time decision-making, aiding in the monitoring of marine protected areas in Cabrera National park, supporting the design of climate change adaptation strategies in Cala Millor urban beach, and creating early warning systems for meteotsunamis in Ciutadella harbour. In this context, SOCIB is leading the development of Digital Twin prototypes (1) of a Marine Protected Area in the Balearic Sea - the case of Cabrera National Park and (2) for Climate change adaptation planning in the Balearic Islands: - the case of Cala Millor urban beachThese localized Digital Twins serve as pilot projects that will inform broader applications of digital twin technology in marine and coastal governance.

- **Open Science and Open Data:** SOCIB is firmly committed to the principles of Open Science, ensuring free access and reusability of its infrastructures, educational resources, data, software, research outputs, and methodologies. This commitment extends to active engagement in citizen science initiatives. The met-ocean Data Repository exemplifies the Open Data approach by providing global access to quality-controlled datasets, fostering collaboration among researchers, policymakers, and educators. Furthermore, SOCIB launched in 2024 its new corporate website designed to enhance functionality, accessibility, and navigation, ensuring a more intuitive and efficient user experience, creating a central hub for data access, research dissemination, and stakeholder engagement, reinforcing SOCIB's mission of transparency and knowledge transfer.

- **Collaboration and knowledge transfer:** SOCIB actively engages in European and international research programs, ensuring its methodologies and findings contribute to global knowledge. Additionally, its outreach and Ocean Literacy initiatives empower communities and stakeholders, enhancing societal understanding of marine and coastal challenges. Beyond research and education, SOCIB plays a key role in designing and implementing governance and public participation strategies that have a significant regional impact. Through co-design approaches and stakeholder engagement frameworks, SOCIB facilitates informed decision-making, promotes sustainable ocean management, and fosters collaborative governance models that strengthen the resilience of Mediterranean marine and coastal ecosystems.

- **Technological leadership:** The SOCIB Glider Fleet and Research Vessel are equipped with state-of-the-art technologies, that together with the technical know-how developed in the last 10 years, enable multidisciplinary research and supporting international collaborations. These assets provide essential data for long-term monitoring and modelling efforts, particularly in a region as ecologically and socio-economically significant as the Mediterranean.

In conclusion, SOCIB's approach exemplifies the relevance of collaboration and specialization in advancing marine science. By complementing national and international infrastructures and focusing on its unique strengths, SOCIB not only addresses regional priorities but also contributes significantly to global efforts in ocean observation, forecasting, and sustainable management. Its integration of cutting-edge technology, open data, and strategic partnerships ensures its ongoing relevance and impact in the scientific community.

1.2. SELF-ASSESSMENT ON THE FULFILLMENT OF ICTS REQUIREMENTS AND CRITERIA

1.2.1. ICTS SOCIB uniqueness and strategic character

Uniqueness in Spain and/or Internationally: The ICTS SOCIB is a unique research infrastructure within the Spanish RDI system, distinguished by its multi-platform scientific and technical capabilities in the Western Mediterranean. Unlike other observatories that focus on specific aspects of the marine environment, SOCIB operates an integrated multi-platform observing system that provides a holistic view of ocean and coastal dynamics. This system includes fixed stations (sea level, coastal, and weather stations, as well as AIS antennas), metoceanographic buoys, gliders, a research vessel, Lagrangian platforms, high-frequency radars, beach videomonitoring stations, and CoastSnap stations.

SOCIB is also the only ICTS in the Balearic Islands, granting it unparalleled access to the highly dynamic Western Mediterranean, a region of strategic scientific, socioeconomic and environmental importance. Furthermore, as one of the areas most vulnerable to climate change impacts, SOCIB's contributions are vital for understanding these effects and helping users find solutions to adapt and respond to them.

Additionally, SOCIB covers the full value chain of oceanographic data, from collection to processing, analysis, and dissemination, prioritizing open data and knowledge sharing, contributing to all regional, national and international scientific communities. SOCIB focuses on innovation, incorporating cutting-edge technologies, and actively participates in collaborations at different levels, strengthening Spain's global position in marine research. Finally, SOCIB adopts a user-driven approach, ensuring its research and infrastructure are relevant and impactful for a wide range of stakeholders. This ensures that its high-quality data reaches a broad range of users, including scientists, policymakers, and the public, maximizing its impact and enhancing ocean knowledge at both national and international levels.

Strategic Character: SOCIB plays a critical role in high-level international research, providing state-of-the-art infrastructure and expertise that enable cutting-edge studies in ocean and coastal dynamics across multiple spatial-temporal scales. Its multidisciplinary approach integrates real-time metocean data and predictive models to assess climate change impacts (including extreme events and human pressures) and support maritime operations, emergency response, and sustainable resource management. This contributes to Spain's leadership in marine science.

Moreover, SOCIB actively supports public policy and governance, providing scientific data, digital tools, and predictive models that inform decision-making at institutional levels. It aligns with key national and European policies, including the Marine Strategy Framework Directive (MSFD), the EU Biodiversity Strategy, and the European Green Deal, ensuring its research is directly relevant to policy development and environmental management.

Added Value to the Spanish RDI System: SOCIB enhances the Spanish RDI ecosystem through its contributions to digital twin prototypes for marine protected areas, climate change adaptation, and early warning systems.

> Its high-resolution metocean data are integrated into major national and international marine data portals (e.g., Copernicus Marine Service, EMODnet), forming the backbone of the European Digital Twin Data Lake.

> SOCIB is supported by a multidisciplinary and committed team, ensuring scientific and technological excellence.

> A new headquarters will further strengthen SOCIB's role in engaging with society and fostering knowledge transfer.

> SOCIB drives innovation and the blue economy by collaborating with the private sector to develop marine-related technologies, thereby supporting Spain's economic growth.

Infrastructure and Equipment Configuration: SOCIB's infrastructure is designed for comprehensive oceanographic research and operational oceanography. Key components include:

> A robust **observing system**, featuring autonomous underwater gliders, Argo profiling floats, surface drifters, high-frequency radars, sea-level stations, coastal stations, oceanographic buoys, meteorological stations, AIS (Automated Identification System) antennas, video monitoring stations, CoastSnap stations, and the research vessel R/V SOCIB. These platforms collect a wide range of oceanographic data, enabling a better understanding of marine processes.

> Advanced **prediction models**, including:
  - Western Mediterranean Operational Model (WMOP) – Ocean circulation forecasting
  - Wave Model (SAPO) – Wave prediction
  - Balearic Rissaga Forecasting System (BRIFS) – Meteotsunami forecasting

  These models provide essential data for maritime safety, coastal management, and climate change adaptation.

Technology: SOCIB employs cutting-edge technology to manage and distribute oceanographic data:

> A massive data archive, currently holding 6.5 TB of observational data (accumulated between 2020 and 2024), 6.4 TB of model data (at yearly basis), and 2.3 TB of satellite data.

> Extensive computing and IT infrastructure, including unified storage systems, NAS and SAN storage, virtualization servers, dedicated computing servers, and other critical IT resources.

Location and Natural Environment: SOCIB's strategic location in the Balearic Islands offers direct access to one of the most dynamic and ecologically significant marine environments in the world. This Western Mediterranean hotspot is highly relevant for studying ocean-atmosphere interactions, climate variability, biodiversity, and anthropogenic pressures, providing a unique opportunity for high-impact marine research.

SOCIB delivers a comprehensive range of **research services**, including:

- Access to its research infrastructures (RV SOCIB and glider fleet) and metocean data (through the Data Repository) for national and international researchers.
- High-quality metocean data to support marine research, public policies, and operational oceanography.
- Cutting-edge digital tools and models for climate adaptation, maritime safety, and sustainable ocean management.
- Knowledge transfer and innovation support, fostering collaboration between academia, industry, and policymakers to drive advancements in marine technology and the blue economy.

Research Services Provided: As an ICTS, SOCIB offers competitive access to the scientific, technological, and industrial communities to its outstanding facility, the SOCIB Metocean Data Repository, which is CoreTrustSeal-certified, as well as its Research Vessel (R/V SOCIB) and Glider Fleet. Additionally, SOCIB provides comprehensive oceanographic, fleet, and instrumentation services, offering expert guidance from decision-making to operational execution.

- Access to the SOCIB Metocean Data Repository is available through the SOCIB Data Catalog, Data API, or THREDDS Data Server, upon registration.
- The Research Vessel (R/V SOCIB) is a coastal catamaran specifically designed to study the Mediterranean Sea while also supporting national and international oceanographic research projects.
- The Glider Fleet enables the collection of ocean data related to Essential Ocean Variables (EOVs) such as temperature, conductivity, depth, fluorescence, and dissolved oxygen, contributing to a better understanding of ocean dynamics.

1.2.2. General objectives of the infrastructure

The ICTS SOCIB, as a research infrastructure, is fully aligned with national and international R&D&I strategic objectives, actively contributing to the development of scientific excellence, technological innovation, and societal impact in the field of marine science and technology. Below is an overview of how SOCIB integrates into these strategic frameworks:

1. Contribution to Knowledge Generation and Scientific Leadership[6]: SOCIB provides access to high-quality, real-time ocean observation data, supporting research in oceanographic processes, modeling, and climate change. Its contribution is reflected in:

- Supporting basic and applied research in operational oceanography and marine sciences.
- Participation in competitive national and international projects, funded by the State Plan and programs such as Horizon Europe.
- Development of new marine observation technologies, including autonomous systems (gliders, Lagrangian buoys) and digital twins for marine environments.

2. Promotion of Innovation and Knowledge Transfer[7]: SOCIB serves as a bridge between the scientific community, industry, and society, fostering innovation and the application of research in:

6. Directly aligned with the objective 4 of the Spanish Science, Technology and Innovation Strategy (2021-2027), hereinafter EECT

7. Directly aligned with EECTI objectives 3, 6 and 7

- Development of oceanographic forecasting models for coastal risk management and climate resilience (aligned with UN Ocean Decade Challenges 6 and 5, respectively).
- Collaboration with private sector and public institutions to develop cutting-edge technologies and services, contributing to the UN Decade Challenge #4.
- Promotion of technology transfer through open data publication and the development of advanced digital tools for oceanographic data management and access, addressing UN Ocean Decade #9.

3. Development of Scientific and Technological Infrastructures[8]**:** As an ICTS, SOCIB is part of Spain's network of strategic research infrastructures and contributes to strengthening the R&D&I ecosystem through:

- A multi-platform marine observation infrastructure, unique in Spain, providing real-time and open-access data (supporting the UN Ocean Decade Challenge 7).
- Advanced modeling and forecasting systems, including the Western Mediterranean Operational Forecasting System (WMOP) and prediction models for meteotsunamis and wave forecasting.
- Integration into initiatives such as the ESFRI roadmap, facilitating collaboration with international research infrastructure networks.

4. Participation in International Programs and Scientific Cooperation[9]**:** SOCIB plays a key role in international cooperation in marine sciences, aligning with European and global priorities through:

- Participation in Horizon Europe, contributing to projects on ocean digitization, climate change, and marine sustainability.
- Collaboration with global networks such as EMODnet, EuroGOOS, GOOS, MONGOOS, and Argo, ensuring its data is integrated into international ocean observation infrastructures.
- Development of Marine Digital Twins, in line with EU strategies and the Digital Twins of the Ocean (DTO) initiative as well as with the Ocean Decade Challenges (#8).

5. Open Science, FAIR Data, and Citizen Engagement[10]**:** SOCIB is at the forefront of open science strategies, ensuring free and reusable access to its data:

- Publishing data following FAIR principles (Findable, Accessible, Interoperable, Reusable), aligned with EU policies and the State Plan.
- Developing the institutional repository, ensuring the long-term preservation and accessibility of scientific and technical outputs.
- Promoting citizen science and science outreach, through initiatives such as CoastSnap, educational workshops, and environmental awareness programs, addressing the UN Ocean Decade Challenge #9.

SOCIB positions itself as a key infrastructure within the national and international R&D&I ecosystem, ensuring alignment with the objectives of the Spanish Strategy for Science, Technology, and Innovation, the State Plan for Scientific Research, Horizon Europe, the ESFRI roadmap, the UN Ocean Decade Challenges and other global strategic initiatives. Its focus on advanced ocean obser-

8. Directly aligned with EECTI objective 4
9. Directly aligned with EECTI objective 2 and 5
10. Directly aligned with EECTI objective 1 and 4

vation, modeling and forecasting, ocean digitization, and knowledge transfer reinforces its role as a central player in research and sustainable marine management.

1.2.3. Investment

The ICTS SOCIB demonstrates a strong commitment to state-of-the-art scientific and technological infrastructure, ensuring its role as a key marine research facility. This commitment is reflected in its continuous upgrades and strategic investments, aimed at enhancing observing and forecasting systems, data management, and technological capabilities to support advanced research and innovation.

A key milestone is the III Addendum to the SOCIB Agreement, which secured 93.4 M€ for the Digital Twin of the Mediterranean (including the update of redeemed equipment), an advanced facility integrating real-time and historical data to enable predictive ocean modeling and support sustainable marine management.

Additionally, SOCIB is constructing a new headquarters at the Port of Palma, which will serve as an R&D&I Marine Hub, funded with €7.5 million through an institutional alliance between MICIU, GOIB, and CSIC.SOCIB's long-term strategic planning ensures continued infrastructure development, including the expansion of its observation network, enhancement of the Metocean Data Repository, and the implementation of Digital Twins of the Ocean. These investments aim to strengthen SOCIB's capabilities, allowing it to contribute to marine research, operational oceanography, and climate adaptation strategies.

1.2.4. Open access

Open Access to our Outstanding Facility

As explained in section 1.1.3., access to ICTS SOCIB's outstanding facility is made through the SOCIB Metocean Data Repository, a comprehensive resource that makes available to users the data collected by the ICTS multi-platform observing and forecasting system (RI System). Access to this Data Repository can be achieved, through:

1. **The Data Catalog:** a user-friendly access point recommended for users without a specialized technical profile, offering query and access services, as well as data visualization tools;
2. **The Data API:** a machine-to-machine access point that allows users to retrieve data through various filters in JSON or NetCDF format;
3. **The THREDDS Data Server:** an access point designed for operational users, providing standard protocols, such as OPeNDAP and WMS.

Access to SOCIB Metocean Data Repository is **considered 'Competitive Open Access'** as defined in Annex 2 of the Agreement[11]. This means data is openly available to any requester, with mechanisms in place to identify users, associated R&D&I projects, and track project results, ensuring transparency and facilitating the identification of data usage and project outcomes.

11. It refers to the '*Agreement of the council of scientific, technological and innovation policy on the update of the map of singular scientific and technical infrastructures*'

In order to assess the use of ICTS SOCIB's Data Repository, we have developed and implemented an Access Metrics System specifically designed for machine-to-machine accesses. This system enables us to track, analyze, and evaluate automated interactions with our repository, providing valuable insights into access patterns, usage trends, and user identification. In particular, this system allows us to evaluate:

- The **volume of data downloaded** (in GBs), categorized by facility and by organization.
- The **number of accesses** to our repository, segmented by facility and by organization.
- The i**dentification** and the **numbers of users**, measured as unique IP addresses interacting with the repository.

However, after a thorough analysis of the metrics, we identified potential biases that could lead to misleading results. While these metrics provide valuable quantitative insights, they also have inherent limitations that must be carefully considered. For example,

- The **volume of data downloaded** depends on the selected download method (i.e. OPeNDAP vs. HTTPServer). In 2023, Puerto del Estado switched its downloading method from OPeNDAP to HTTPServer, leading to an increase in downloaded data from that year onward, and significantly impacting overall data download metrics (see Table 1 below).
- The **number of access** can be significantly influenced by the access frequency, as seen with organizations like Puerto del Estado, which drastically reduced its access frequency in 2023, significantly impacting the overall number of access (see Table 1 below).
- Using **unique IPs** to measure the **number of users** can be misleading, since multiple users within the same organization might share a single IP, or a single user could access the repository from multiple devices. Additionally, bot attacks have been seen to artificially inflate the number of unique IPs.

Table 1. Key metrics related to data access and usage at ICTS SOCIB from 2021 to 2024.

	2021	2022	2023	2024
Number of Accesses	30,756,141	38,192,115	13,552,093	6,850,715
Number of users	1826	605	4448	4663
Data Downloaded (in TBs)	2.1	1.6	6.6	15.4
Number of organizations	33	17	29	27

To address these issues, SOCIB has implemented initial refinements, such as filtering out bot attacks, and will prioritize further improvements to the Access Metrics System in the coming years in the context of this strategic plan. Actions will focus on optimizing the user registration system to enhance user tracking, demand analysis, and data product segmentation, ultimately providing a more accurate and comprehensive understanding of the reach and impact of SOCIB's data (see A.3.1.1. Optimization of the user registration system for data access across all SOCIB to SOCIB outstanding facility).

Table 2. Key metrics related to data access and usage at ICTS SOCIB during the 2021-2024 period and segmented by facility.

	DATA DOWNLOADED (IN GBS) (2021-2024)	NUMBER OF ACCESSES (2021-2024)
Gliders	604.2	114,866
R/V SOCIB	8,7	30,384
Beach Monitoring	5,400	4,741,185
Lagrangian Platforms	10	67,933
High-Frequency Radar	602.7	557,657
Fixed Stations	14,500	80,262,269
Modelling & Forecasting	4,500	2,906,558

When looking at these metrics segmented by facility (table 2 above), it can be observed that the **most downloaded data** come from the Fixed Station Facility, the Modeling and Forecasting Facility, and the Beach Monitoring Facility. However, it is important to note that a significant portion of our data is made available through European Data Aggregators: Copernicus Marine Service In-Situ, SeaDataNet, etc. In particular, **100% of our Glider data** is accessible on the Coriolis Global Data Assembly Center, which means that the data is primarily retrieved from this platform, leading to reduced direct access to our repository for Glider-related data. Similarly, our **Lagrangian Platforms** operate within the frameworks of the NOAA-Global drifter and Argo Observing Programs, with **100% of the Lagrangian Platforms data** being available on these platforms. As a result, there is less direct access to our repository for Lagrangian data as well. SOCIB HHR data also contributes to the Global HFR network. This broader integration undoubtedly enhances the reach, usage, and distribution of our data, ensuring that it is more widely accessed and utilized within the global scientific community. In the coming years, the ICTS SOCIB will develop a data traceability strategy to better monitor and assess the usage of its data globally (see A.3.1.2. Definition of the Traceability Strategy for SOCIB's Metocean Data).

The relevance and impact of **SOCIB's data** are demonstrated by their utilization by leading national and international institutions across various sectors of **marine research, operational oceanography, environmental monitoring, and maritime safety**. Below is the list of the top 15 organizations (identified by their IP address, which in the case of institutions remains constant and can be considered a unique identifier) ranked by the volume of data downloaded:

1. **Puerto del Estado** (Spain).
2. **Mediterranean Oceanographic Network for the Global Ocean Observing System (MONGOOS)**.
3. **Instituto Español de Oceanografía** (**IEO**, Spain).
4. **Red de Supercomputación de Galicia** (Spain).
5. **Consejo Superior de Investigaciones Científicas** (**CSIC,** Spain).
6. **Sociedad de Salvamento y Seguridad Marítima** (**SASEMAR**, Spain).
7. **European Marine Observation and Data Network** (EMODnet).
8. **Consiglio Nazionale delle Ricerche** (**CNR**, Italy).
9. **Shandong University** (China).

10. **Università degli Studi di Trieste** (Italy).
11. **University of Washington** (USA).
12. **University of California San Diego** (**UCSD**, USA).
13. **Secretaría de Estado de Administraciones Públicas** (**MINHAP**, Spain).
14. **Observatoire Océanologique CNRS** (France).
15. **Slovenian Environment Agency** (Slovenia).

This diverse list of top organizations utilizing these resources highlights SOCIB's global impact and the essential contribution of its data to a variety of scientific and operational fields.

Open Access to the important facility SOCIB Glider Fleet

Throughout the 2021-2024 period, despite the Glider Facility not being classified as an outstanding facility, ICTS SOCIB has consistently reported all operational days in the ICTS DATA application, where it has been recorded as an Outstanding Facility. This ongoing reporting has ensured the continuous evaluation of the Glider Facility by the Spanish Ministry of Science, Innovation, and Universities (MICIU).

Access to the Glider Fleet is regulated by a public Access Protocol, which outlines the mechanisms and criteria for obtaining access to this facility. The **two access modalities are**: the Competitive Open Access, and the On-Demand Access, with the former modality offering lower service fees.

At least twice a year, when the Competitive Open Access calls are open, proposals are submitted through the Open access website, and evaluated and prioritized based on scientific and technical excellence by an **External Access Committee** composed of internationally renowned experts in ocean observation platforms and glider operations from diverse institutions. Resolutions granting access are published in the Open access website, which also maintains a historical record of access decisions and calls. In cases where prioritization was unnecessary due to low demand, the External Committee assessed the scientific and technical quality of the proposals without the need for scoring.

During 2021-2024, SOCIB has issued a total of 9 calls, as published in the Open access website. This has allowed to increase the rate of competitive open access from 16% in 2022 and 12% 2023 to a final rate of 24% in 2024. Please see **2.8. New outstanding facilities proposal** for more detailed information.

Access On Demand allows for the submission of applications at any time, with their technical feasibility being assessed by an Internal Panel. The document "Pricing of the Ordinary Services of SOCIB (in Spanish)" provides information on the costs associated with using this infrastructure under this access mode.

Open Access to SOCIB Research Vessel

Access to the SOCIB Research Vessel (R/V) facility is managed by the Commission for the Coordination and Monitoring of Oceanographic Vessel Activities (COCSABO), the coordinating body for the scientific and technical activity carried out by the vessels of the Unique Scientific and Technical Infrastructure (ICTS) Spanish Oceanographic Fleet (FLOTA). The R/V SOCIB was part of FLOTA until March 2022.

While a formal open access protocol is not yet in place, SOCIB is committed to promoting open access to its R/V. A specific action in the strategic plan aims to establish a comprehensive open access protocol, including an External Access Committee, to make the R/V more accessible to the broader scientific community.

During 2021-2024, access to the R/V was granted through continuous open calls, allowing researchers to apply at any time.

> **Competitive Open Access:** 11 mission days were granted in 2023 and 28 mission days in 2024.

> **On-Demand Access:** 10 requests (91 mission days) were granted in 2023, and 18 requests (83 mission days) were granted in 2024.

1.2.5. Scientific & Technical Advisory Committee

The ICTS SOCIB has fully renovated the Scientific and Technical Advisory Committee (STAC) since September 2024. The STAC is responsible for assessing SOCIB's long-term scientific and technological strategies and activities, providing recommendations, and proposing actions for improvement. This includes preparing periodical reports on SOCIB's Scientific and Technological Program, with recommendations on research and technology priorities, evaluating scientific activities and their results, advising on R&D agreements and partnerships, and conducting other assigned scientific and technological advisory activities.

> **Composition and international relevance of the members:** The current STAC comprises 10 experts from renowned public, private, and academic institutions worldwide, ensuring diverse expertise and a global perspective on SOCIB's activities. Members are recognized leaders in fields such as oceanography, data management, technology, marine ecology, artificial intelligence, and international cooperation. To ensure gender and geographical balanced representation, the STAC includes 5 women and 5 men from 7 countries: Germany, France, USA, UK, Spain, Italy, and Belgium. The current STAC members are:

  - **Dr. Joanna Staneva**, Institute for Coastal Research, Helmholtz Centre Geesthacht (Hereon), Germany.
  - **Mr. Mathieu Belbeoch**, OceanOPS, France.
  - **Dr. Hugh Roarty**, Center for Ocean Observing Leadership, Rutgers University, USA.
  - **Dr. Emma Heslop**, Intergovernmental Oceanographic Commission of UNESCO, France.
  - **Dr. Alberto Arribas**, National Oceanography Centre, UK.
  - **Dr. Javier Varona Gómez**, Universitat de les Illes Balears, Spain.
  - **Dr. Marina Tonani**, Mercator Ocean International, France.
  - **Dr. Simona Simoncelli**, Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Bologna, Italy.
  - **Dr. Kate Larkin**, EMODnet Secretariat, Belgium.
  - **Dr. Javier Ruiz**, CSIC- Instituto de Ciencias Marinas de Andalucía, Spain.

> **Independence of the STAC:** The committee is structurally separate from SOCIB's management and operational bodies. This prevents conflicts of interest and ensures that assessments and recommendations are based on objective criteria. None of the STAC members are from SOCIB's management, operational bodies, or contracted personnel.

> **Rules of procedure:** The STAC operates according to defined and agreed terms of reference, which outline its mission, composition, responsibilities, working principles, time commitment and member rotation and selection. The committee is committed to hold an annual 1.5-day virtual meeting, where decisions are made by unanimous consensus. STAC members serve four-year terms, renewable once, and adhere to a code of conduct that includes confidentiality

and conflict of interest declarations. Members may request to interrupt their mandate or be replaced as needed.

> **Annual STAC meeting:** The annual meeting held virtually on December 3-4, 2024. The two-day meeting included an open session with presentations and discussions on SOCIB's Observing and Forecasting Systems as well as Data Center Facility, Marine operations and Corporate Strategy, Outreach and Knowledge transfer services, followed by a private session where the STAC reviewed strategic plans, research activities, and technological advancements. During this meeting, the STAC evaluates SOCIB's strategic plans, research activities, and technological advancements, providing critical feedback and recommendations on research priorities, technology development, data dissemination, and international collaborations that are summarized in the STAC report (see **2.7. STAC report on the Strategic Plan 2025-2028**).

1.2.6. Management

Legal form: SOCIB's legal form is a Consortium. It is officially the Consortium for the design, construction, equipment and operation of the Coastal Observation System of the Balearic Islands (SOCIB)[12]. Since October 2014, the Consortium has been part of the Map of Unique Scientific and Technical Infrastructures, currently being the only one in the Balearic Islands. In 2020, the Spanish National Research Council (CSIC) joined as a new member of the Consortium.

Organizational structure: Recently, the ICTS SOCIB has renewed its organizational structure and updated its organizational chart to better align with current needs and foster a more integrated and user-driven approach. According to the ICTS SOCIB's governing statutes, the ICTS is structured into three areas: the Technological Area, the Scientific Area, and the Economic-Administrative Area. In 2022 and 2023, with the approval of 14 new structural positions, two Area Heads were appointed to strengthen leadership across these two key functions: the Head of the Scientific Area, and the Head of the Technological Area, In addition, in order to respond to the growing demands on strategic planning, a fourth Strategic service has been created, encompassing Strategy, Transfer of Knowledge and Communication, and the corresponding Head of Strategy & Communication was appointed. With the Head of the Economic-Administrative Area / Manager, these four leadership roles, together with the Director and the Office of the Director, form the **Steering Committee**, which oversees the implementation of strategic objectives and ensures accountability. Here we provide a description of these four areas and the different teams that form ICTS SOCIB's organizational char (Figure 1 below):

1. **Technological Area:** this area manages marine operations, laboratories, and research vessels, ensuring the execution of observational campaigns, and manages the IT infrastructure (Computing & IT and Data Center). In total, 19 people work in this area.

2. **Scientific Area:** this area encompasses the multi-platform observing and forecasting system, which includes the Modeling & Forecasting Facility, the Beach Monitoring Facility, the Lagrangian platforms facility, the Gliders facility, the HF Radar facility, as well as the recently created Satellite facility (since 2024). In total, 19 people work in this area and 2 students are being supervised.

3. **Economic-Administrative Area:** this area oversees finance, project management, contracting, and human resources, and supports the institution's sustainability and efficient resource allocation. In total, 6 people work in this area.

12. BOE núm. 83, de 5 de abril de 2008.

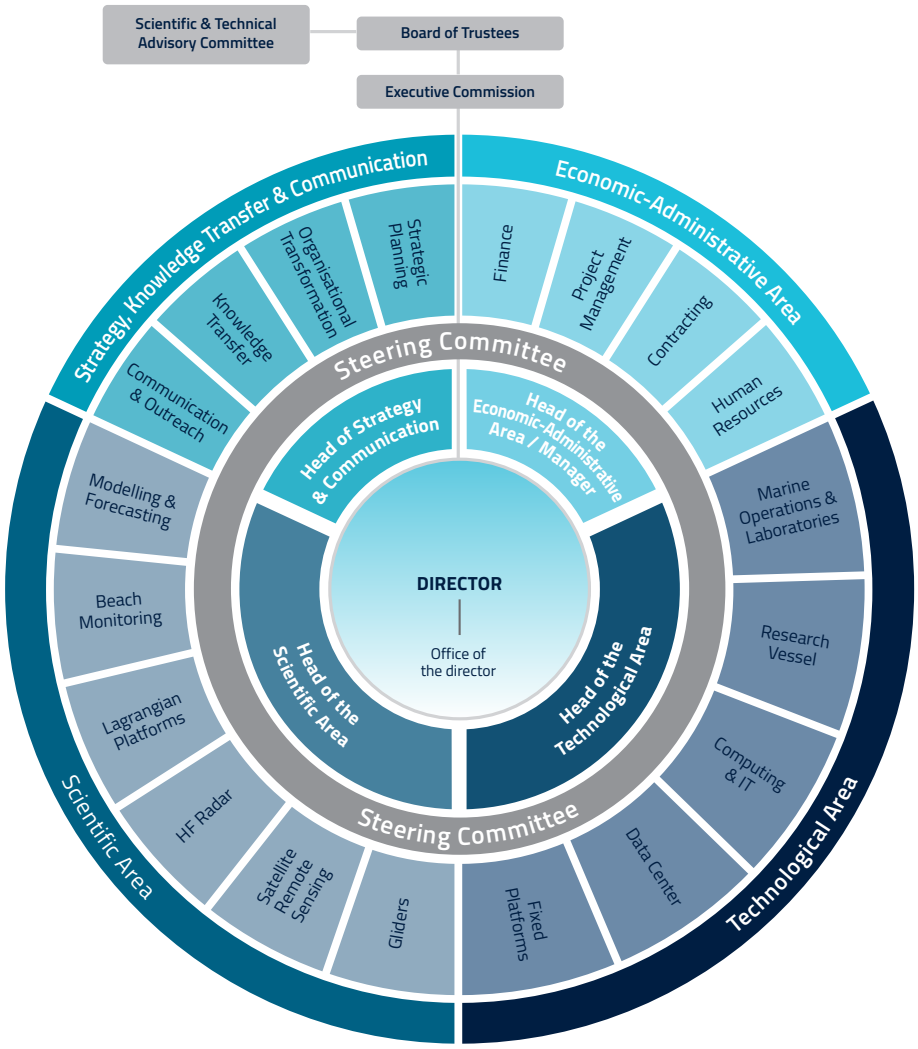
4. **Strategy, Knowledge Transfer & Communication:** this service encompasses strategic planning, organizational transformation, outreach and communication, as well as transfer of knowledge, and supports the institution to define its strategy and enhance its impact. In total, 7 people work in this area.

This organizational structure ensures the clear division of responsibilities for operational efficiency, while fostering a collaborative and integrated approach into these four areas.

At the top, two external advisory bodies — the **Board of Trustees** and the **Executive Commission** — provide oversight, ensuring that the institution's activities align with broader scientific, technical, and strategic objectives. Additionally, the **Scientific & Technical Advisory Committee** supports decision-making by providing expert recommendations.

SOCIB remains committed to continuous organizational improvement, fostering collaborative leadership, professional development, and gender equality within its structure and strategy. To align with the 3rd Addendum and the Mediterranean Digital Twin Outstanding Facility, SOCIB will develop an Organizational Transformation Plan to enhance teamwork, shared decision-making, and adaptive governance. This approach ensures SOCIB's ability to adapt to new challenges, strengthen efficiency, and maintain its leadership in marine science, digital innovation, and institutional governance.

Figure 1. ICTS SOCIB's Organizational chart.



1.2.7. Staff

The ICTS SOCIB has a highly qualified and multidisciplinary team, ensuring the efficient operation of its infrastructures and services while meeting the ICTS requirements. The staff is composed of scientists, engineers, technicians, and management personnel, who work collaboratively across different environments—from the open sea aboard the Research Vessel R/V SOCIB, to coastal stations, laboratories, workshops, and offices.

SOCIB's staffing structure is designed to guarantee the efficient management and operation of the infrastructure and services offered in a competitive access, as well as to provide comprehensive user support. SOCIB ensures technical excellence through a balanced team with a strong focus on operational capabilities, data services, and user assistance.

As of December 31st, 2024, the current team consists of **53 professionals** (in addition to the director) with a diverse range of academic qualifications, including doctoral, master's, and technical degrees, ensuring the necessary expertise to maintain and develop SOCIB's key services and including:

- **Permanent staff (37):** 11 PhD holders (7 female, 4 male), 22 professionals with master's degrees (13 female, 9 male), and 4 technicians with professional training (1 female, 3 male).
- **Temporary staff (14):** 2 PhD holders (male), 12 with master's degrees (5 female, 7 male), and others with technical expertise.
- **Practicing staff (2):** contributing to the beach monitoring and glider facilities.

This robust and well-structured staffing model ensures that SOCIB meets ICTS criteria, maintaining a high standard of operational efficiency while reinforcing its role as a leading research infrastructure in marine and environmental sciences.

1.2.8. Strategic plan

SOCIB has developed strategic plans, starting in 2010, to define its objectives, strategies, and resources. The quality of these plans is ensured through a structured peer review international evaluation process, which includes the assessment by the Scientific and Technical Advisory Committee (STAC). The STAC plays a critical role in reviewing and validating the scientific and technical rigor of the plan, ensuring its alignment with SOCIB's mission and international research priorities.

For instance, the 2021–2024 activities were thoroughly reviewed by the STAC, and its feedback contributed significantly to shaping the 2025–2028 Strategic Plan, which focuses on developing the digital twins of the ocean, contributing to advance ocean and coastal research and innovation to address critical challenges such as climate change, coastal hazards, coastal resilience, and sustainable development in the Mediterranean region.

The 2025–2028 Strategic Plan is structured around **three fundamental pillars**: scientific excellence, technological innovation, and societal impact. These pillars guide SOCIB's commitment to the **6 strategic objectives** included: i) develop functional Digital Twins to support ocean and coastal decision-making in the Balearic Sea; ii) improve observation, prediction, and data management to ensure sustainable and open data for SOCIB RI System; iii) enhance open access to outstanding facilities, services, and scientific and technical contributions to foster ocean research and innovation; iv) reinforce knowledge transfer, corporate communication, and strategic planning to enhance

SOCIB's institutional impact; v) strengthen organizational structure, promote professional development, and improve corporate management quality to enhance institutional efficiency, and; vi) ensure the long-term sustainability of ICTS SOCIB and successfully commission the new headquarters. Key initiatives include expanding digital infrastructure for data sharing, enhancing operational oceanography capabilities, developing regional digital twins to improve ocean monitoring and forecasting, and strengthening partnerships with stakeholders at regional, national, and international levels. The regional digital twins will integrate real-time and historical data, enhancing predictive modeling and facilitating informed decision-making for climate adaptation, coastal resilience, and sustainable ocean management.

To ensure the quality and effective execution of the plan, SOCIB has established a Monitoring Committee that regularly reviews progress, evaluates performance against strategic objectives, and implements necessary adjustments to maintain alignment with the organization's mission and evolving priorities. This mechanism complements the oversight provided by the STAC, reinforcing the governance framework of the strategic plan.

Additionally, the strategic planning process integrates a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis, ensuring that SOCIB's strategy leverages its strengths, addresses weaknesses, capitalizes on opportunities, and mitigates risks. The participatory development approach, involving the entire SOCIB community, further ensures that the plan is aligned with institutional priorities while fostering internal commitment to its implementation.

The STAC has assessed the 2021–2024 Strategic Plan positively, acknowledging its scientific rigor, alignment with international research priorities, and potential impact on marine science and technology. The Assessment Report from the STAC, received on January 28, 2025, is attached for reference.

1.2.9. Production and performance

During the 2021–2024 period, ICTS SOCIB demonstrated exemplary scientific and technological performance. Key achievements include advancing marine monitoring technologies, fostering open science, and promoting societal engagement through education, communication, and knowledge transfer. These accomplishments underscore SOCIB's commitment to addressing global challenges and driving sustainable development through cutting-edge technologies and innovation.

Consolidating excellence in ocean observation: ICTS SOCIB strengthened its position as a leader in integrated multiplatform ocean observation, ocean prediction, and data management in the Mediterranean. Over the past four years, it provided competitive access to research groups and private-sector stakeholders nationally and internationally, showcasing its impact in ocean sciences. Key milestones include:

- **Glider fleet operations:** SOCIB's glider fleet completed 64 missions over 2,422 days at sea, producing 79,575 high-resolution CTD profiles. SOCIB also expanded mission areas and integrated biogeochemical sensors, enabling the measurement of key ocean variables like dissolved oxygen and chlorophyll. These advancements have improved the ability to monitor ocean health, offering insights into marine ecosystems and the impacts of climate change. Notably, SOCIB received first prize for the best national project funded by ERDF in 2021, recognizing its excellence in operational research and technological innovation.
- **Oceanographic campaigns:** SOCIB conducted 72 oceanographic campaigns aboard the R/V SOCIB, totalling 396 operational days. Campaigns in biodiversity hotspots, especially the CANALES campaigns in the Mallorca and Ibiza channels, advanced knowledge of physical and biogeo-

chemical processes. These campaigns supported studies on water mass exchanges and their ecosystem impacts, generating datasets publicly available through the EMODnet portal. This data is vital for stakeholders, including the scientific community and the blue economy.

> **Technological enhancements:** SOCIB strengthened its operational and observational capabilities through key upgrades. The WMOP model runs daily, improving forecasting accuracy, while BRIFS simulations were expanded to enhance meteotsunami risk assessments. Between 2021 and 2024, all data management systems of the 12 remote stations were updated, improving their reliability and aligning them with the cybersecurity protocols established by the National Security Scheme (ENS). AIS reception antennas were added to five coastal stations, extending reception coverage. In 2022, as part of a collaboration with IMEDEA, a third beach videomonitoring station was added to the SOCIB coastal network. Additionally, CoastSnap bases were installed to promote citizen science. In 2023, the oceanographic buoy in Sóller was reinstalled. In 2024, in collaboration with the Instituto Hidrográfico de la Marina (IHM), contributed to the installation of a tide gauge in Sóller. Within the EBAMAR project, a buoy was installed in 2024 on Mallorca's east coast, further expanding SOCIB' s buoy network.

> **Participation in relevant research projects:** During the 2021–2024 period, ICTS SOCIB participated in numerous research projects (38), including:

- **International (3):** highlighting the CALYPSO project to study 3D transport in the Alboran and Balearic Seas.
- **European (23):** including H2020 and Horizon Europe projects like JERICO-S3 and EuroSea, focusing on coastal observation and providing solutions for climate, ocean health, and the blue economy.
- **National (12):** highlighting the FaSt-SWOT project to characterize ocean small-scale structures for SWOT satellite mission calibration and TIAMAT project (Marine Observatory of Global Change in the National Parks Network) which analyzes the impacts of global change on marine systems in Spanish National Parks, using satellite data to develop monitoring and early warning tools for extreme ocean events.
- **Regional (2):** including the PIMA ADAPTA Climate Impact Study, which highlighted potential losses of over 50% of beach area along the Balearic coastline by the century's end, emphasizing the importance of adaptation measures and he LIFE AdaptCalaMillor project developed a governance framework to adapt Cala Millor's beach systems to climate change, offering a model that could be replicated across the Mediterranean.
- **UN Ocean Decade Actions:** Including the CoastPredict initiative, which SOCIB co-leads, including over 250 experts from 36 countries, aiming to improve coastal ocean observation and prediction.
- **Digital Twins of the Ocean (DITTO) Program:** contributing to scientific activities related to digital twins.

> **High-impact publications:** During this period, SOCIB produced 64 peer-reviewed articles in high-impact journals and delivered 145 presentations at international conferences, including presentations at the international Digital Twins of the Ocean Summit 2023, the EOSC Symposium in 2023, the Digital Ocean Forum in 2024. Key research findings from SOCIB include, among many others: a decade of data analysis to understand coastal erosion, published in Scientific Data; studies on Mediterranean warming trends, published in Frontiers in Marine Science; international collaborative efforts to improve oceanographic research integration; identification of reduced maritime traffic in the Western Mediterranean during COVID-19, published in Nature Communications; research on vertical exchanges in ocean structures, published in the Journal of Geophysical Research (Oceans) and the Journal of Physical Oceanography; and development

of models for sustainable tuna fisheries management. Additionally, SOCIB has made regional contributions, such as spatial analysis of nautical carrying capacity for the Balearic Islands.

> **Strategic collaborations:** Since 2021, the Consortium has actively fostered collaborations, establishing a wide network of agreements, action protocols, and research partnerships. This includes 2 international agreements, 5 European agreements and 1 action protocol, 18 national agreements and 3 action protocols, and 25 regional agreements and 2 action protocols. Furthermore, SOCIB has prioritized educational cooperation through 4 agreements with Spanish universities. SOCIB's participation in research networks is extensive, with involvement in 8 international, 7 European, 23 national, and 22 regional working groups. These diverse collaborations highlight SOCIB's commitment to knowledge exchange and its significant role in the national and international research landscape.

These activities reflect SOCIB's contributions to marine research, international collaboration, and the development of adaptation frameworks for addressing regional and global challenges.

Open Data and digital transformation: The ICTS SOCIB reaffirmed its commitment to open science and innovation through its Metocean Data Repository (RI System). Between 2021 and 2024, the repository facilitated access for an annual average of 2,886 strategic users in the research field, adhering to rigorous international standards and earning the CoreTrustSal certification in 2022, reinforcing SOCIB's role as a reliable and transparent data provider. The repository offers 28 Essential Ocean Variables from observational system and 21 from prediction systems, contributing to global efforts in open data sharing and research. SOCIB advanced digital transformation by launching a new corporate website and an institutional repository in 2024, enhancing data accessibility, usability, and user experience. The website recorded over 53,917 sessions and 329,254 page views in this period, reflecting its reach and relevance for users. Key digital tools, such as the ONA Toolbox for assessing climate change impacts and the TIAMAT Observatory for monitoring climate change in National Parks, further contributed to addressing global environmental challenges. The launch of these tools highlights SOCIB's dedication to providing practical resources for climate change adaptation and advancing ocean research. In addition to open science initiatives, SOCIB has a catalog of 16 digital applications aimed at improving decision-making, data visualization, and public engagement. SOCIB also contributed significantly to the Copernicus program, ensuring seamless access to in-situ data and strengthening its position in digital innovation and environmental research. Notably, the Sub-regional Mediterranean Marine Heat Waves tool, developed by SOCIB, identified unprecedented marine heatwave events in the Balearic Sea, providing crucial insights into the impacts of climate change on marine ecosystems.

Promoting ocean literacy and societal engagement: Between 2021 and 2024, ICTS SOCIB advanced communication, dissemination, and ocean literacy, fostering stronger connections between marine science and society. SOCIB organized 68 outreach activities that engaged over 30,453 participants, including seminars, exhibitions, educational workshops, open days, and roundtables. Key outputs included the production of 18 videos, 8 podcasts, 16 teaching resources, 4 infographics, and the organization of 15 travelling exhibitions, enhancing public understanding of ocean research and its relevance to global challenges. Citizen science played a pivotal role, highlighted by the launch of CoastSnap monitoring stations in the Balearic Islands and SOCIB's active participation in international networks like EU4Ocean and Ocean Observers, promoting collective efforts in ocean literacy and conservation. SOCIB also developed impactful resources, such as the video "The Balearic Sea: Seven Principles of Ocean Literacy", and curated an outreach catalogue featuring 67, including teaching units and interactive tools. Through these efforts, supported by an effective social media strategy and robust international engagement, SOCIB raised awareness about ocean conservation, global change impacts, and the importance of marine research for sustainable development. Between 2021 and 2024, SOCIB's social media channels reached a total of 5,420 followers, enhancing its visibility and engagement with diverse audiences globally.

Educational collaborations and training: SOCIB reinforced its commitment to education and capacity-building by supervising 1 PhD thesis (with two more in progress), 11 Master's theses, 7 Bachelor's theses, and hosting 36 internships, fostering the next generation of oceanographers and marine technicians. Collaborations with institutions like the University of the Balearic Islands (UIB) and the University of Cádiz expanded training opportunities, strengthening marine science education and research. Notably, in 2022, a SOCIB student received the Modesto Vigueras Award for outstanding research on particle retention in the Strait of Gibraltar, demonstrating the impact of SOCIB's training programmes.

Organisational transformation and strategic advancements: Between 2021 and 2024, ICTS SOCIB achieved significant progress in its organisational structure, strategic planning, and infrastructure development, strengthening its role in oceanographic research and innovation. Central to these efforts was the implementation of a strategic planning framework, supported by the creation of a Monitoring Commission, composed of the Steering Committee. Through quarterly meetings, this commission ensured the successful execution of projects by monitoring progress, identifying deviations, and implementing corrective measures.

Key developments included the creation of annual compliance reports aligned with Law 40/2015, which reinforced SOCIB's adherence to legal and regulatory frameworks. Additionally, SOCIB introduced an indicator-based evaluation system with clear verification mechanisms to enhance accountability and performance assessment. Innovative tools, such as a prototype balanced scorecard dashboard and the Nemosina Institutional Database, were developed to centralize the management, preservation, and organisation of activities, improving operational efficiency and long-term planning.

As part of its transformation, SOCIB completed a restructuring process, establishing a new organisational chart, strategic roles, and dedicated commissions to enhance efficiency and governance.

Looking ahead: Building on these results, SOCIB successfully fulfilled 86.5% of the planned actions in its 2021–2024 Strategic Plan. Remaining actions will transition to the 2025–2028 Strategic Plan to ensure continued progress and innovation in oceanographic research and societal engagement.

1.2.10. Funding

During the period between 2021 and 2024, SOCIB managed a structural budget of €14.3 million, complemented by a total budget of €20.4 million, which included grants and project funding. Operating income was primarily sourced from European funds (€1.9 million), the Spanish State (€9.4 million), and the regional government (€7.5 million). Additionally, service income contributed significantly, with €0.95 million from public sector collaborations and €0.199 million from private sector engagements. These financial resources have been instrumental in supporting SOCIB's mission, ensuring the sustainability and advancement of its observing and forecasting operations. For more information, see document 2.1: Staff and Funding.

The Strategic Plan 2025–2028 is underpinned by a comprehensive financial framework detailed in the Third Addendum to the Agreement between the Ministry of Science and Innovation and the Government of the Autonomous Community of the Balearic Islands, published in the Official State Gazette (BOE-A-2023-15222) on June 29, 2023. This addendum secures a total funding commitment of 93.4 M€ for the 2024–2033 period, ensuring the continued growth, sustainability, and operational excellence of SOCIB's activities.

For the 2025–2028 period, a total allocation of 37.4 M€ structural funds will be dedicated to advancing SOCIB's strategic objectives. Of this, 12.8 M€ will be invested in enhancing infrastructure, observation, and forecasting systems, as well as developing SOCIB Digital Twins —high-resolution models crucial for monitoring and simulating complex oceanic and coastal processes. The remaining 24.6 M€ will support personnel and operational costs, ensuring the expertise and resources necessary for the effective implementation of these initiatives.

The planned investments in the SOCIB Strategic Plan 2025-2028 amount to a total of 14.7 M€, which includes 12.8 M€ from structural funds and an additional 1.9 M€ from competitive funding calls (see 2.6. Investment Plan). These resources will be distributed attending the three investment types as required in the investment plan (2.6. Investment Plan): 9.7 M€ will be allocated to maintaining the operability and capabilities of the SOCIB RI System Outstanding Facility while preventing obsolescence (type 1). Additionally, 2.0 M€ will be dedicated to expanding and improving its capacities, ensuring it remains at the forefront of technological and scientific advancements developing SOCIB Digital Twins (type 2). Lastly, 3.0 M€ will be invested in other strategic initiatives, further supporting the development, sustainability, and efficiency of these critical scientific and technological infrastructures (type 3).

All investments in this plan are high priority, directly addressing critical needs identified for carrying out the actions outlined in the strategic plan, such as upgrading aging infrastructure, enhancing research capabilities, and ensuring SOCIB's continued operation and competitiveness. SOCIB has secured the necessary funding to support these high-priority investments, ensuring their feasibility and timely implementation.

These resources will empower ICTS SOCIB to expand its scientific, technological, and societal contributions, ensuring its position as a leader in marine research, data accessibility, and community engagement.

1.2.11. Public ownership

The ICTS SOCIB Consortium is a public entity with its own legal personality, established under public law and fully publicly owned. It is affiliated with the General State Administration through the Ministry of Science and Innovation, the State Agency Spanish National Research Council (CSIC), and the Government of the Autonomous Community of the Balearic Islands (CAIB), as outlined in its statutes.

The Consortium was created in 2007 through an agreement between the then Ministry of Education and Science and the Government of the Balearic Islands. It operates under the framework of the agreement published in BOE No. 83 on April 5, 2008, with the aim of designing, building, equipping, and operating the Balearic Islands Coastal Observing and Forecasting System (SOCIB). Since October 2014, SOCIB has been part of the Map of Singular Scientific and Technical Infrastructures (ICTS), being the only ICTS located in the Balearic Islands. In 2020, CSIC joined as a member of the Consortium.

ICTS SOCIB's governance and administrative structure ensures accountability and transparency, with the Board of Trustees (Consejo Rector) as the highest decision-making body, followed by the Executive Commission (Comisión Ejecutiva) and the Director, who serves as the legal representative of the Consortium.

The ICTS SOCIB Consortium's funding and ownership structure are outlined in the agreement published in BOE No. 154, dated June 29, 2023. Financing is equally shared (50%) between the General

State Administration (through MICIU and CSIC) and the CAIB. Voting rights within the Governing Council are distributed as follows: MICIU holds 46.70%, CAIB holds 50.00%, and CSIC holds 3.30%. This ownership and governance structure ensures that SOCIB operates in full alignment with the principles of public ownership and serves its mission to advance marine research and innovation for societal benefit.

2

STRATEGIC PLAN 2025 - 2028

2.1. ANALYSIS OF COMPLIANCE WITH THE PREVIOUS STRATEGIC PLAN

During the 2021-2024 period, 86.5% of the planned objectives and strategies outlined in the Strategic Plan of ICTS SOCIB were successfully achieved, reflecting a strong commitment to its implementation (Table 1).

Table 1. Execution rate of Objectives and Strategies in the Strategic Plan 2021-2024.

	Planned actions	Achieved actions	Execution rate
O1. Enhance ICTS SOCIB's ocean observing and forecasting capacities and reinforce competitive open access	**19**	**15**	**78.9%**
S.1.1. Update and maintain existing observing and forecasting capabilities	9	8	88.9%
S.1.2. Expand and enhance observing and forecasting capabilities	6	4	66.7%
S.1.3. Increase the number of competitive accesses to ICTS SOCIB Unique Facilities: R/V SOCIB & Glider fleet	4	3	75.0%
O2. Boost the visibility, accessibility and use of oceanographic data	**15**	**11**	**73.3%**
S.2.1. Improve an oceanographic data management programme: integrated and standardized data	5	3	60.0%
S.2.2. Obtain quality brands and trust seals in oceanographic data	2	1	50.0%
S.2.3. Align ICTS SOCIB's data policy with the International Open Data and Open Science mandates	3	3	100.0%
S.2.4. Reinforce monitoring impact, traceability, and continuous evaluation of the usage of oceanographic data and other resources of ICTS SOCIB	1	1	100.0%
S.2.5. Develop a Digital Strategy applying sustainable and smart solutions to oceanographic data	2	2	100.0%
S.2.6. Integrate and distribute ICTS SOCIB's oceanographic data	2	1	50.0%
O3. Promote social, economic, and environmental impacts through added-value ocean products and services	**16**	**12**	**75.0%**
S.3.1. Reinforce a Responsible Research and Innovation (RRI) Strategy	1	1	100.0%
S.3.2. Promote the restructure of SIAS Division	1	1	100.0%
S.3.3. Update ICTS SOCIB's oceanographic products and services	5	4	80.0%
S.3.4. Develop new ICTS SOCIB's oceanographic products and services	9	6	66.7%

	Planned actions	Achieved actions	Execution rate
O4. Support and promote excellence in marine and coastal research at the regional, national, and international levels	**19**	**19**	**100.0%**
S.4.1. Strengthen strategic collaborations in research and innovation at the regional, national and international levels	3	3	100.0%
S.4.2. Promote ICTS SOCIB research lines in marine ecosystems, ocean health, ocean variability, and operational oceanography	12	12	100.0%
S.4.3. Promote the development and adoption of Ocean Best Practices (OBS)	1	1	100.0%
S.4.4. Stimulate training of new generations of oceanographers and technicians	3	3	100.0%
O5. Encourage society engagement and promote ocean literacy	**16**	**15**	**93.4%**
S.5.1. Foster Ocean Literacy, public recognition of ocean observatories and marine environmental education	10	10	100.0%
S.5.2. Enhance participation in Citizen Science projects	3	2	66.7%
S.5.3. Grow brand awareness, find and engage the target audience	3	3	100.0%
O6. Improve and strengthen the functioning and organizational structure of ICTS SOCIB	**11**	**11**	**100.0%**
S.6.1. Renew the structure, organizational chart, and internal functioning of ICTS SOCIB	1	1	100.0%
S.6.2. Develop and implement strategic human resources planning	5	5	100.0%
S.6.3. Strengthen the ICTS SOCIB brand identity	3	3	100.0%
S.6.4. Break-ground the new ICTS SOCIB headquarters: open up to Balearic Islands society	2	2	100.0%
Global	**96**	**83**	**86.5%**

In relation to the execution of the objectives, three out of the six (O4, O5, and O6) achieved an execution rate above 90% for all their actions and strategies. Additionally, the execution rate for the remaining three objectives (O1, O2, and O3) was also commendable, with a performance level exceeding 70% in each case. With respect to the strategies, many of the ones included in these objectives were fully completed, reaching an execution rate of 100%. This high level of accomplishment demonstrates ICTS SOCIB's dedication to achieving its ambitious strategic goals and ensuring impactful progress in oceanographic research, innovation, and societal engagement.

More specifically with respect to the actions, 84 out of the 96 planned actions from the 2021–2024 Strategic Plan have been achieved. The remaining 12 actions were not completed due to staffing limitations, unsuccessful competitive funding applications, and, in some cases, reliance on third parties for specific indicators. It is also worth noting that many of these 12 actions are now in an advanced stage of development. Actions not completed during the 2021–2024 period, but aligned with the entity's mission and vision, and identified in the SWOT analysis as essential for addressing weaknesses, mitigating threats, maintaining strengths, or leveraging opportunities, will be carried forward into the 2025–2028 period. This approach ensures continuity in strategic efforts and leverages the progress made to date.

In Annex 2, Compliance of Strategic Plan 2021-2024, a detailed breakdown is provided for each action, specifying a concise and direct justification with links to means of verification as requested in the Multiannual Plan 2023-2026 and the Annual Plans of 2023 and 2024 Annual and their Compliance carried out yearly (all in Spanish).

2.2. MISSION AND VISION[1]

The mission of ICTS SOCIB is to operate an observing and forecasting system in the Western Mediterranean and provide data, facilities, services and digital tools to advance the understanding of the ocean and transfer knowledge to society.

The vision of ICTS SOCIB is to become a research infrastructure leader in the field of marine R&D&I and contributing to the development of a digital twin in the Mediterranean to support decision-making in a context of climate change.

2.3. SWOT ANALYSIS

The SWOT analysis offers valuable insights into SOCIB's current strengths, weaknesses, opportunities, and threats within the framework of the 2025-2028 Strategic Plan (Table 2). This SWOT has been developed through a participatory process initiated in november 2024 and considering the STAC[2] Report (2.7.).

Table 2. ICTS SOCIB SWOT Analysis.

STRENGTHS
S1 SOCIB uniquely combines its role as the only multi-platform ocean observatory in the Western Mediterranean with full involvement in the data lifecycle, supporting advanced coastal, oceanographic, and forecasting research.
S2 Leadership in multi-platform observation, ocean prediction, and data management, enhancing innovation and supporting real-time decision-making for coastal and ocean management.
S3 Open access to historical and real-time metocean data through a FAIR and CoreTrustSeal certified repository.

1. The mission and vision of SOCIB were updated through an internal participatory process in June 2023. Access to the report of the participatory process is available through the report link.

2. Scientific and Technical Advisory Committee.

S4 Skilled scientific and technical multidisciplinary staff excelling in oceanography, data science, forecasting, management, and communication.
S5 Recognized experience in knowledge transfer to enhance social impact, combined with leadership in ocean literacy, engaging public awareness at local, national, and international levels.
S6 Connection and leadership with relevant European and international initiatives and networks, actively participating in international, European, and national projects.
S7 Engagement in collaborative networks and working groups, fostering strong relationships with stakeholders, strategic sectors, and a diverse range of users to address current societal and scientific challenges in the regional national e international context.
S8 Financial stability in the short/medium term, supporting strategic initiatives and investments in observing, forecasting, data access, research and outreach capabilities.
S9 Strong ICTS brand recognition and enhanced visibility with the new headquarters as a science communication hub.

WEAKNESSES
W1. Difficulties attracting and retaining talent due to hiring processes, salaries, and limited career plans.
W2. Challenges in attracting skilled professionals in AI, big data, IT, and software development, including those needed for digital twin development, due to national administrative barriers, contribute to a growing skills gap and slow project progress.
W3. Lack of specialized web development personnel hinders advancements to the digital ecosystem and user interfaces.
W4. Rigid and bureaucratic regulatory framework in administrative procedures.
W5. Limited HPC resources.
W6. Extensive engagement in a wide range of research projects, along with the periodic expansion of work areas to include new topics and facilities, risks diluting specialization and diverting focus from the ICTS's core priorities.
W7. Difficulties to maintain at SOCIB the high level qualified data engineers and to monitor data usage and demonstrate the impact of SOCIB's resources and the SOCIB RI system & data repository outstanding facility.
W8. Limited CSIC scientific and technical integration hinders SOCIB's access to resources and opportunities, creates uncertainty about the long-term collaboration, and limits potential synergies and joint ventures.
W9. The absence of UIB in SOCIB's governing bodies limits synergies in research, education, and resource sharing, weakening its regional impact and strategic leadership.
W10. SOCIB's outdated statutes (most of the articles are from 2007) risk misalignment with evolving priorities, hindering governance, adaptability, and the integration of innovation and open science.

OPPORTUNITIES
01. Emerging technologies, such as Digital Twins and AI, present an opportunity to strengthen SOCIB's capabilities and reinforce its global leadership in marine research and innovation.
02. The growing demand for environmental data positions SOCIB as a central hub for observing, forecasting, metocean data management and dissemination in the Mediterranean.
03. The UN Ocean Decade provides a global framework for SOCIB to boost international collaborations and expand training capacities in ocean science and sustainability. Initiatives such as the EU Digital Twins of the Ocean and/or Destination Earth and the UN Decade Programs Digital Twin of the Ocean (DITTO) and CoastPredict, offer opportunities to align SOCIB's capabilities with cutting-edge digital tools for ocean monitoring and management, enhancing its role in addressing global challenges like climate change.
04. The global shift towards open science and data-sharing policies creates a strategic opportunity for SOCIB to amplify its visibility and impact by leveraging its advanced digital ecosystem, well aligned with CSIC and National Strategies.
05. The new forthcoming SOCIB's headquarters in the Port of Palma offer a collaborative environment and a unique opportunity to develop synergies with local and regional stakeholders.
06. SOCIB's new Plan for Dissemination and Knowledge Transfer, linked to its new headquarters, offers the opportunity to engage broader audiences through innovative tools like Science on Sphere (SoS).
07. SOCIB's expertise in stakeholder collaboration and the co-design of digital twin prototypes, such as for Cabrera National Park and Cala Millor, provides a unique opportunity to inform public policies, developing tailored applications and services that address societal challenges through innovative solutions.
08. The proposal of SOCIB's glider fleet as an outstanding facility offers a key opportunity to meet growing user demand and strengthen its role in advancing oceanographic research and global scientific collaboration.
09. SOCIB's substantial pool of technical personnel provides an opportunity to address the shortage of such expertise in research centers, fostering collaboration and innovation in the Balearic Islands and also at National level, contributing towards the development of a new Spanish Strategy of Ocean Observing.
010. The creation of the new Satellite Facility at SOCIB provides a unique opportunity to enhance coastal and oceanic research and response capabilities, develop innovative climate adaptation solutions, and support evidence-based decision-making through advanced satellite data integration.

THREATS
T1. Legislative changes, evolving R&D&I policies, global crises, and potential funding instability jeopardize SOCIB's long-term financial stability.
T2. High living costs in Mallorca deter skilled professionals, negatively impacting talent attraction and retention.

T3. Cybersecurity risks, such as data breaches and system vulnerabilities, pose threats to SOCIB's reputation and operational trust.
T4. Development of new initiatives and private enterprises may reduce SOCIB's prominence and significance in the marine science field
T5. Rising expectations from users and stakeholders demand a robust engagement framework, risking dissatisfaction and reputational harm if unmet.
T6. Complex and limiting access criteria for facilities like gliders (i.e., not considering the international access to the glider fleet as part of the requested 20% competitive access), the R/V SOCIB, and the Metocean Data Repository may limit usage, hinder research opportunities, and reduce accessibility.
T7. Unclear data citation criteria in national project applications hinder SOCIB's proper recognition for its data contributions.
T8. Administrative burdens from dual planning requirements, such as the strategic plan (2021-2024 and now 2025-2028) and multi-year plan (2023-2026) with annual plans and associated fulfillment annual reports), reduce SOCIB's agility and divert resources away from research and operational activities.

2.4. OBJECTIVES OF THE NEXT FOUR-PERIOD

2.4.1. Description of objectives

The ICTS SOCIB objectives derived from the SWOT analysis that will be driving us towards the mission and vision over the next four years are:

O1. Develop functional Digital Twins to support ocean and coastal decision-making in the Balearic Sea: Objective 1 (O1) aims to develop and implement functional digital twins for the Balearic Sea, for knowledge based management of Marine Protected Areas (MPAs) and adaptation of urban beaches to climate change. This will be achieved through a co-design process engaging diverse stakeholders, to ensure the Digital Twins meet their specific needs. O1 will establish a robust and scalable data infrastructure, integrating diverse data sources from enhanced observing and forecasting systems, and leveraging cutting-edge technologies like AI and machine learning for predictive modeling, simulation, and automated data analysis (including image processing and automated quality control). The Digital Twins will feature user-friendly interfaces tailored to different scientific and societal needs, ensuring accessibility and contributing to informed decision-making. Continuous testing, validation and stakeholder feedback will be integral to the development process, ensuring the Digital Twin's fitness-for-purpose and maximizing their impact on marine and coastal sustainable and knowledge based management in the Balearic Sea.

O2. Improve observation, prediction, and data management to ensure sustainable and open data for SOCIB RI System: O2 aims to strengthen SOCIB's multiplatform observing system, improve oceanic predictions, and expand integrated marine data products for the Mediterranean Sea. By maintaining and upgrading key observational assets, such as autonomous platforms, and monitoring systems, SOCIB ensures continuous and high-quality data collection and curation. Predictive capabilities will be optimized ensuring the continuous operation, through advanced modeling and AI-driven analytics, enhancing model validation with ocean and coastal observations. ICTS SOCIB will also enhance its data infrastructure, further aligning with FAIR principles and Open Science policies to improve accessibility, compatibility, security, interoperability, and long-term data reliability. A stronger focus on open data, quality control, best practices and certification will ensure transparency, sustainability, and efficiency. All these actions aim at ensuring sustainability and open data to SOCIB outstanding facility: the Meteocean Data Repository (from the RI System). Furthermore, these efforts directly support a robust data foundation which is essential for the development and application of Digital Twins of the Ocean.

O3. Enhance open access to outstanding facilities, services, and scientific and technical contributions to foster ocean research and innovation: O3 aims to maximize the accessibility and impact of SOCIB's research infrastructures and metocean data, fostering research excellence, and strengthening strategic collaborations. This is achieved by enhancing data access and traceability through system optimization, a comprehensive traceability strategy aligned with FAIR principles, and an improved Data Catalog. Competitive open access to SOCIB's key facilities—including the Metocean Data Repository, glider fleet, and Research Vessel— is ensured via regular glider access calls (to ensure at least 20% of accesses) and research vessel open access protocols and the nomination of an External Access Committee, while increasing user diversity and competitive engagement.. To coordinate and optimize these competitive access procedures, and also consider the potentialities from the digital twins, an internal Access Unit will be established. The inclusion of additional facilities, e.g. the Beach Monitoring Facility, to open access calls will be also analysed. Complementing these efforts, SOCIB will disseminate high-impact research through peer-reviewed publications and actively participate in R&D&I forums and conferences, thereby enhancing its scientific reputation. Finally, national and international collaborations are fostered by strengthening strategic partnerships and engaging in joint initiatives with other Spanish ICTSs, and solidifying SOCIB position as a leader in global marine research and sustainable ocean management.

O4. Reinforce knowledge transfer, corporate communication, and strategic planning to enhance SOCIB's institutional impact: O4 aims to strengthen SOCIB's impact on society, visibility, and reputation as an ICTS and a leader in Digital Twins of the Ocean, focusing on transfer of knowledge and dissemination. To achieve this, SOCIB will promote Open Science, optimize digital platforms, and develop high-quality outreach materials to engage strategic users and sectors. A socioeconomic impact study will assess and enhance SOCIB's contribution to society, while the "Working Backwards" protocol will ensure that digital solutions effectively meet user needs. SOCIB will enhance the training of future professionals by offering mentoring, internships, and thesis supervision in collaboration with academic institutions, expanding opportunities in marine sciences and technologies, among other related fields.SOCIB will also improve access to resources and data by optimizing its institutional repository and corporate website and launching digital campaigns to increase impact and engagement. Advanced strategic planning tools will be implemented, including a Balanced Scorecard and a collaborative tool for strategic planning and reporting. SOCIB will develop an Organizational Transformation Plan to promote collaborative leadership, strengthen internal cohesion, and enhance institutional adaptability and efficiency.

O5. Strengthen organizational structure, promote professional development, and improve corporate management quality to enhance institutional efficiency: O5 aims to foster a collaborative and efficient work environment by enhancing talent attraction, professional development, and work-life balance. This includes implementing human resources, gender equality, and remote work plans, as well as providing continuous staff training. Administrative and management processes will be optimized through digitalization, incorporating tools like a task management system, intranet, and Enterprise Resource Planning (ERP) software to improve efficiency and transparency. Additionally, SOCIB will ensure compliance with the Spanish National Security Framework to protect information systems, reinforcing governance, service quality, and institutional resilience. These efforts will contribute to a more agile, inclusive, and high-performing organization, supporting SOCIB's long-term sustainability and innovation capacity.

O6. Ensure the long-term sustainability of ICTS SOCIB and successfully commission the new headquarters: O6 ensures the successful launch and full operability of SOCIB's new headquarters at the Palma R&D&I Marine Hub. This objective encompasses equipping common spaces, laboratories, and outreach areas, ensuring RedIRIS connectivity with UIB node, and coordinating an efficient relocation process to minimize operational disruptions. In addition, SOCIB will modernize and expand its IT services to secure a robust digital infrastructure and efficient data management. Furthermore, SOCIB will update its ICTS statutes—modernizing its legal framework to align with current strategic objectives, the III Addendum, and the development of the digital twins of the ocean. This update will reinforce governance, facilitate knowledge transfer, and ensure compliance with national and international research standards. Strategic collaborations with CSIC and UIB will further enhance these initiatives advancing towards integrating SOCIB into CSIC's research framework and fostering synergies in research, education, and innovation. Collectively, these measures will strengthen SOCIB's institutional resilience, expand its influence in the Mediterranean research community, and ensure its sustained impact on ocean and coastal science and long term sustainability.

2.4.2. Strategies to achieve the objectives

In order to envision the 6 ICTS SOCIB's strategic objectives and reach them, SOCIB will develop the following 20 strategies (Table 3).

Table 3. Strategies and specific actions to achieve the objectives.

O1. Develop functional Digital Twins to support ocean and coastal decision-making in the Balearic Sea
S.1.1. Develop the Digital Twin of a Marine Protected Area in the Balearic Sea - the case of Cabrera National Park
A.1.1.1. Co-design of the Digital Twin of a Marine Protected Area - the case of Cabrera National Park
A.1.1.2. Development of the Digital Twin prototype of a Marine Protected Area- the case of Cabrera National Park
A.1.1.3. Testing and validation of the Digital Twin of a Marine Protected Area - the case of Cabrera National Park
S.1.2. Develop the Digital Twin for Climate change adaptation planning - the case of Cala Millor urban beach
A.1.2.1. Co-design of the Digital Twin for Climate change adaptation planning - the case of Cala Millor urban beach
A.1.2.2. Development of the Digital Twin prototype for Climate change adaptation planning - the case of Cala Millor urban beach
A.1.2.3. Testing and validation of the Digital Twin for Climate change adaptation planning - the case of Cala Millor urban beach

S.1.3. Enhance SOCIB technical infrastructure and AI capabilities to support the development of the Digital Twins of the Ocean
A.1.3.1. Adapting SOCIB's observing system to support the development of the Digital Twins of the Ocean
A.1.3.2. Adapting SOCIB's forecasting system to support the development of the Digital Twins of the Ocean
A.1.3.3. Development of AI capabilities and expertise for improved ocean observation and forecasting in Digital Twins of the Ocean
O2. Improve observation, prediction, and data management to ensure sustainable and open data for SOCIB RI System
S.2.1. Enhance the ICTS SOCIB's multiplatform observation system
A.2.1.1. Renewal of the Glider fleet and equipment
A.2.1.2. Enhancement, optimization, and continuous monitoring of the HF Radar
A.2.1.3. Ensuring continuous data collection with Lagrangian platforms
A.2.1.4. Upgrade and maintenance of Beach Monitoring platforms
A.2.1.5. Implementation of the Satellite Facility
A.2.1.6. Modernization of SOCIB's equipment pool for operations
S.2.2. Optimize the operational capabilities of ICTS SOCIB's predictive models
A.2.2.1. Continuous improvement and sustainability of the Western Mediterranean Operational Forecasting System (WMOP)
A.2.2.2. Optimization and continuous operation of the Balearic Rissaga Forecasting System (BRIFS)
A.2.2.3. Updating and maintenance of the Autonomous Wave Forecasting System (SAPO)
S.2.3. Update, renew, and maintain ICTS SOCIB's data infrastructure
A.2.3.1. Enhancement and maintenance of SOCIB's software infrastructure
A.2.3.2. Development of new functionalities and redesign SOCIB data processing system
S.2.4. Enhance data quality control, FAIR level, and ensure alignment with international standards
A.2.4.1. Improvement of existing and develop new Data Management Plans of the observing programs
A.2.4.2. Incorporation and updating the quality-controlled FAIR data products into the ICTS SOCIB Data Catalog
A.2.4.3. Renewal and enhancement of the CoreTrustSeal certification
O3. Enhance open access to outstanding facilities, services, and scientific and technical contributions to foster marine research and innovation
S.3.1. Promote the access, use and traceability of data through the SOCIB outstanding facility
A.3.1.1. Optimization of the user registration system for data access across all SOCIB entry points to SOCIB outstanding facility
A.3.1.2. Definition of the Traceability Strategy for SOCIB's Metocean Data
A.3.1.3. Improvement of functionalities of ICTS SOCIB Data Catalog
S.3.2. Ensure competitive access to ICTS SOCIB's facilities
A.3.2.1. Launch of new competitive access calls for gliders
A.3.2.2. Design future open access to SOCIB Research Vessel
A.3.2.3. Structuring and improving competitive access to SOCIB's facilities and services
S.3.3. Foster research excellence aligned to ICTS SOCIB mission and vision
A.3.3.1. Publication of high-impact research on ocean science and technology
A.3.3.2. Key participation in R&D&I forums, conferences and congresses

S.3.4. Encourage ICTS SOCIB's leadership in national and international collaborations
A.3.4.1. Strengthening strategic partnerships and research networks
A.3.4.2. Engagement in joint scientific and technical initiatives with ICTS
O4. Reinforce knowledge transfer, corporate communication, and strategic planning to enhance SOCIB's institutional impact
S.4.1. Increase knowledge transfer to strategic users and sectors
A.4.1.1. Conduction of a socioeconomic impact study of the ICTS SOCIB
A.4.1.2. Implementation of "Working Backwards" protocol to SOCIB's digital applications
A.4.1.3. Strengthening training of future generations
A.4.1.4. Design and implementation of SOCIB's Institutional Open Science Policy
S.4.2. Strengthen SOCIB's visibility, positioning, and institutional reputation through digital optimization, strategic content creation, and impactful public engagement
A.4.2.1. Optimization of the functionality and experience of external and internal users of the corporate website
A.4.2.2. Creation and publication of high-quality information, outreach, and educational content and resources
A.4.2.3. Organization of activities and events with impact in the areas of knowledge transfer, communication, dissemination and training
A.4.2.4. Development and execution of media outreach and science communication strategies
S.4.3. Promote communication, citizen science, and dissemination of coastal and marine science and SOCIB Digital Twins
A.4.3.1. Installation, commissioning and development of the Science on a Sphere (SoS) outreach space
A.4.3.2. Implementation of the Communication and Training Plan of SOCIB Digital Twins
S.4.4. Strengthen institutional planning and organizational transformation
A.4.4.1. Implementation of advanced strategic planning tools
A.4.4.2. Promotion of organizational transformation, collaborative leadership, and adaptive governance
O5. Strengthen organizational structure, promote professional development, and improve corporate management quality to enhance institutional efficiency
S.5.1. Promote an organization that fosters collaboration, talent attraction, and career development
A.5.1.1. Implementation of the Human Resources Plan
A.5.1.2. Execution of the I Gender Equality Plan
A.5.1.3. Rollout of the ICTS SOCIB Staff Training Plan
A.5.1.4. Adoption of the I Remote Work Plan
S.5.2. Optimize and digitalize administrative, management, and communication procedures
A.5.2.1. Rollout of the Task Management System
A.5.2.2. Development of the ICTS SOCIB Intranet
A.5.2.3. Implementation of an Enterprise Resource Planning (ERP)
S.5.3. Adapt ICTS SOCIB to the National Security Framework
A.5.3.1. Implementation of the Specific Compliance Profile (SCP) for Essential Security Requirements of the National Security Framework

O6. Ensure the long-term sustainability of ICTS SOCIB and successfully commission the new headquarters
S.6.1. Ensure the operability of SOCIB's new headquarters with connectivity, equipment, and an efficient relocation
A.6.1.1. Installation of the Global Research Network RedIRIS at SOCIB's New Headquarters
A.6.1.2. Provision of furniture and scientific equipment for the New Headquarters
A.6.1.3. Relocation of staff, equipment, and resources to the New Headquarters
A.6.1.4. Implementation and expansion of IT Services in the new SOCIB Headquarters
S.6.2. Strengthen SOCIB's governance and long-term sustainability through collaboration with CSIC and UIB and the modernization of its institutional framework (statutes)
A.6.2.1. Contribution to the design of an Ocean Observing National Strategy
A.6.2.2. Incorporation of UIB into SOCIB's Governance Bodies
A.6.2.3. Update of the ICTS SOCIB Statutes to assure sustainability, enhance governance, adaptability, and strategic alignment

These specific strategies address the results of the ICTS SOCIB's SWOT analysis in the following CAME analysis (Table 4). 2.4.3. Strategies implementation (foreseen actions)

Table 4. CAME analysis addressing the SWOT analysis.

Correct **Strategies aimed at correcting weaknesses**	S.4.4. Strengthen institutional planning and organizational transformation
	S.5.1. Promote an organization that fosters collaboration, talent attraction, and career development
	S.6.2. Strengthen SOCIB's governance and long-term sustainability through collaboration with CSIC and UIB and the modernization of its institutional framework (statutes)
Adapt **Strategies aimed at adapting to threats**	S.3.1. Promote the access, use and traceability of data through the SOCIB outstanding facility
	S.5.2. Optimize and digitalize administrative, management, and communication procedures
	S.5.3. Adapt ICTS SOCIB to the National Security Framework
Maintain **Strategies aimed at maintaining strengths**	S.2.1. Enhance the ICTS SOCIB's multiplatform observation system
	S.2.2. Optimize the operational capabilities of ICTS SOCIB's predictive models
	S.2.3. Update, renew, and maintain ICTS SOCIB's data infrastructure
	S.2.4. Enhance data quality control, FAIR level, and ensure alignment with international standards
	S.3.3. Foster research excellence aligned to ICTS SOCIB mission and vision
	S.3.4. Encourage ICTS SOCIB's leadership in national and international collaborations
	S.4.1. Increase knowledge transfer to strategic users and sectors

Exploit **Strategies aimed at exploiting opportunities**	S.1.1. Develop the Digital Twin of a Marine Protected Area in the Balearic Sea - the case of Cabrera National Park
	S.1.2. Develop the Digital Twin for Climate change adaptation planning - the case of Cala Millor urban beach
	S.1.3. Enhance SOCIB technical infrastructure and AI capabilities to support the development of the Digital Twins of the Ocean
	S.3.2. Ensure competitive access to ICTS SOCIB's facilities
	S.4.2. Strengthen SOCIB's visibility, positioning, and institutional reputation through digital optimization, strategic content creation, and impactful public engagement
	S.4.3. Promote communication, citizen science, and dissemination of coastal and marine science and SOCIB Digital Twins
	S.6.1. Ensure the operability of SOCIB's new headquarters with connectivity, equipment, and an efficient relocation

2.4.3. Strategies implementation (foreseen actions)

Based on the objectives identified and the SWOT analysis carried out, ICTS SOCIB's strategy for the period 2025-2028 will be structured into **60 specific actions** related to **20 strategies** and 6 **objectives**.

2.4.3.1. Specific actions addressing Objective 1

To achieve the **3 strategies** linked to Objective 1. Develop functional Digital Twins to support ocean and coastal decision-making in the Balearic Sea, the following **9 actions**, described below, will be implemented.

Table 5. Specific actions addressing Objective 1.

Action	Indicator
Strategy 1.1: Develop the Digital Twin of a Marine Protected Area in the Balearic Sea - the case of Cabrera National Park	
A.1.1.1. Co-design of the Digital Twin of a Marine Protected Area - the case of Cabrera National Park: The co-design implementation actively engages stakeholders throughout the design and development process to ensure the Digital Twin of a Marine Protected Area (Cabrera National Park) in the Balearic Sea meets their needs and expectations. This includes stakeholder mapping, establishing governance structures (e.g., user committee), and forming collaborative partnerships. Key activities involve workshops, feedback sessions, and iterative prototyping to refine the system. Additionally, knowledge transfer initiatives will develop materials and capacity building activities. Continuous stakeholder engagement and progress monitoring will ensure the Digital Twin remains aligned with evolving needs and expectations.	Creation of a user committee of the Digital Twin of a Marine Protected Area (Cabrera National Park) in the Balearic Sea.
A.1.1.2. Development of the Digital Twin prototype of a Marine Protected Area - the case of Cabrera National Park: It involves the development of a Minimum Viable Product (MVP) with just enough features to validate the idea early in the product development cycle. This includes as a crucial first step the development of a robust infrastructure that can handle the data volume and complexity, ensuring the DT's long term functionality, scalability and interoperability, the identification of core functionalities, prioritizing data integration, and creating a user-friendly interface for stakeholders to interact with the prototype.	100% of the Digital Twin prototype of a Marine Protected Area (Cabrera National Park) developed.

Action	Indicator
A.1.1.3. Testing and validation of the Digital Twin of a Marine Protected Area - the case of Cabrera National Park: This action involves a thorough assessment to determine if the Digital Twin of a Marine Protected Area (Cabrera National Park) is fit-for-purpose, as the final step of the prototyping process. This includes gathering feedback from both internal (project core team #1, i.e. intermediate users) and external stakeholders (identified A1.1.1, i.e. lambda users), and creating a detailed test plan. The process emphasizes presenting the prototype face-to-face, testing with internal stakeholders of Cabrera national Park and providing clear instructions for testing to ensure comprehensive evaluation and validation.	At least 10 survey responses and analysis of the digital twin.
Strategy 1.2: Develop the Digital Twin for Climate change adaptation planning - the case of Cala Millor urban beach	
A.1.2.1. Co-design of the Digital Twin for Climate change adaptation planning - the case of Cala Millor urban beach: Co-design implementation actively engages stakeholders throughout the design and development process to ensure the Digital Twin for Climate Change Adaptation Planning in urban beaches (Cala Millor bay) in the Balearic Sea meets their needs and expectations. This includes stakeholder mapping, workshops, feedback sessions, and iterative prototyping. It also involves establishing governance structures and collaborative partnerships, as well as knowledge capacity building activities. Continuous engagement and progress monitoring ensure alignment with stakeholder needs and expectations.	Creation of a user committee of the Digital Twin for Climate change adaptation planning in urban beaches (Cala Millor bay) in the Balearic Sea.
A.1.2.2. Development of the Digital Twin prototype for Climate change adaptation planning - the case of Cala Millor urban beach: It involves the development of a Minimum Viable Product (MVP) with just enough features to validate the idea early in the product development cycle. This includes as a crucial first step the development of a robust infrastructure that can handle the data volume and complexity, ensuring the DT's long term functionality, scalability and interoperability, the identification of core functionalities, prioritizing data integration, and creating a user-friendly interface for stakeholders to interact with the prototype.	100% of the Digital Twin prototype for Climate change adaptation planning in urban beaches (Cala Millor bay) developed.
A.1.2.3. Testing and validation of the Digital Twin for Climate change adaptation planning - the case of Cala Millor urban beach: This action involves a thorough assessment to determine if the Digital Twin for Climate change adaptation planning in urban beaches (Cala Millor bay) is fit-for-purpose, as the final step of the prototyping process. This includes gathering feedback from both internal (project core team #1, i.e. intermediate users) and external stakeholders (identified A1.2.1, i.e. lambda users), and creating a detailed test plan. The process emphasizes presenting the prototype face-to-face, testing with internal stakeholders, and providing clear instructions for testing to ensure comprehensive evaluation and validation.	At least 10 survey responses and analysis of the digital twin.
Strategy 1.3: Enhance SOCIB technical infrastructure and AI capabilities to support the development of the Digital Twins of the Ocean	
A.1.3.1. Adapting SOCIB's observing system to support the development of the Digital Twins of the Ocean: For the Digital Twin of a Marine Protected Area (Cabrera National Park), it involves the enhancing of the observing network in the MPA area of the Cabrera National Park and adjacent areas (from NE Mallorca to Ibiza channel), by deploying and optimizing observing platforms to improve data collection, monitoring capabilities, and understanding of the MPAs oceanographic processes. This includes the deployment of drifters and Argo profilers, acquiring coastal profilers, redesigning glider missions, potential GNSS buoy installation in collaboration with IGN, and incorporating high-resolution satellite data. For the Digital Twin for Climate change adaptation planning (Cala Millor urban beach), it involves the development of advanced data extraction methods from the different instrumental sources (in-situ and remote sensing) of the facility, expand observing areas (shoreline) by means of CoastSnap (planned partnership with DGECTECC, GOIB), integrate RT ocean variables in one of the stations (installation of buoy 2028), incorporate high-resolution satellite data (AI derived bathymetries).	At least 5 key observing platforms adapted.

Action	Indicator
A.1.3.2. Adapting SOCIB's forecasting system to support the development of the Digital Twins of the Ocean: For the Digital Twin of a Marine Protected Area (Cabrera National Park), it includes the use -for validation and/or data assimilation- of observational data from various sources (drifters, Argo profiling floats, gliders, and satellites) to validate and improve high-resolution oceanographic models. For the Digital Twin for Climate change adaptation planning (Cala Millor urban beach), the forecasting system will be enhanced to better predict wave propagation and flooding. This also includes integrating a coastal erosion model and coupling ocean and wave prediction systems for advanced near-shore wave propagation forecasting.	At least 2 key forecasting models adapted.
A.1.3.3. Development of AI capabilities and expertise for improved ocean observation and forecasting in Digital Twins of the Ocean: This action focuses on advancing SOCIB's capacity in Artificial Intelligence (AI) to significantly improve ocean observation, data management, and forecasting capabilities within the Digital Twin of the Ocean (DTO) framework. This involves using AI for data analysis, quality control, improving prediction with machine learning, developing AI algorithms for automatic image analysis, integration of ML models for storm prediction, plan and implement AI-focused formative actions, and building partnerships with AI research institutes and innovation laboratories to create synergies between SOCIB's goals and cutting-edge AI advancements. With this action, SOCIB will enhance its internal AI capabilities, positioning it to potentially contribute to future IA Factory developments in Spain, consistent with the EU Digital Strategy.	At least 3 AI-focused training actions.

2.4.3.2. Specific actions addressing Objective 2

The following **14 actions**, described below, will be executed to support the implementation of the **4 strategies** under Objective 2. Improve observation, prediction, and data management to ensure sustainable and open data for SOCIB RI System.

Table 6. Specific actions addressing Objective 2.

Action	Indicator
Strategy 2.1: Enhance the ICTS SOCIB's multiplatform observation system	
A.2.1.1. Renewal of the Glider fleet and equipment: SOCIB will maintain its glider capabilities with two new gliders, upgraded batteries, sensors such as hydrophones, to improve autonomous monitoring, data collection, operational efficiency, and data quality, supporting research and operational oceanography in the Mediterranean Sea, contributing to enhanced scientific competitive access to SOCIB infrastructures and digital twins. The process will begin with the preparation of the call for tender, ensuring optimal procurement. After deployment, a field operation report will assess performance and integration into SOCIB's observing network. This expansion will strengthen autonomous monitoring, providing high-resolution and quality oceanographic data for operational oceanography and research in the Western Mediterranean.	At least 7 gliders available.
A.2.1.2. Enhancement, optimization, and continuous monitoring of the HF Radar: SOCIB will maintain and upgrade its High-Frequency Radar (HFR) system to ensure it remains operational and up-to-date. It includes continuous maintenance of the HFR Online Outage Tool (HOORT), including the APIs of HOORT and the APIs of the European HFR Node, and the HFR system itself, updating the Ibiza HFR station, and acquiring drifters for performing Antenna Pattern Measurement (APM) experiments every two years as recommended by the Best Practices. These efforts will maintain the HFR's functionality and improve surface current data accuracy for oceanographic monitoring and research.	At least 90% of uptime percentage.

Action	Indicator
A.2.1.3. Ensuring continuous data collection with Lagrangian platforms: ICTS SOCIB will maintain and increase its operational fleet of Lagrangian platforms, including surface drifters and Argo profiling floats, to ensure continuous data collection and contribute to oceanographic monitoring and research efforts. This action will focus on maintaining the network of active platforms, aligned with international initiatives such as the Global Drifter Program and EuroARGO ERIC.	At least 3 Argo profiling floats and 8 surface drifters active per year.
A.2.1.4. Upgrade and maintenance of Beach Monitoring platforms: ICTS SOCIB will upgrade and maintain its Beach Monitoring platforms to enhance coastal research and management. This includes investing in Raspberry Pi accessories, camera system renovations and sediment analysis equipment (granulometer and oven). These upgrades will improve data collection, monitoring capabilities, and operational efficiency, supporting the study of coastal processes, erosion, sediment transport, and climate change impacts in some beaches of the Balearic Islands. This will also contribute to the ongoing development of access strategies for SOCIB's Beach Monitoring infrastructures, including considerations for scientific use.	At least 2 videomonitoring stations operational at yearly basis.
A.2.1.5. Implementation of the Satellite Facility: ICTS SOCIB will implement its satellite facility by migrating existing data and toolboxes to its institutional servers, converting existing MATLAB toolboxes to Python, and improving applications tailored to the Digital Twins. This aims to improve data accessibility and user experience, providing continuous and updated oceanographic information, particularly for the Balearic Islands' coastal zones.	At least 4 satellite datasets and 1 toolbox migrated to cooperative servers.
A.2.1.6. Modernization of SOCIB's equipment pool for operations: This action focuses on renewing and upgrading SOCIB's operational and IT equipment to ensure service continuity, enhance efficiency, and support data collection capabilities. It includes the renewal of diving equipment, vehicles, and measurement tools, the acquisition of a small winch for the Hurricane vessel and a van for the glider team, as well as the upgrade of coastal and sea level monitoring stations. Additionally, IT and navigation tools such as the Hypack license and RTK Geonorte system will be integrated to improve data accuracy and operational efficiency. The establishment of online services will further enhance accessibility and infrastructure management.	At least 6 equipment renovated.
Strategy 2.2: Optimize the operational capabilities of ICTS SOCIB's predictive models	
A.2.2.1. Continuous improvement and sustainability of the Western Mediterranean Operational Forecasting System (WMOP): This action ensures the continuous operation and accuracy of the WMOP system, using data from the Copernicus Marine Service, in collaboration with AEMET, and offering support to major users such as SASEMAR or the Balearic Government. It encompasses regular system updates, improvement of the monitoring system for real-time performance insights, and regular accuracy assessments. Rigorous data quality control procedures and enhanced access to WMOP data via the website, including user support, are also included.	At least 90% of the days per year providing 48 h WMOP forecast.
A.2.2.2. Optimization and continuous operation of the Balearic Rissaga Forecasting System (BRIFS): The Balearic Rissaga Forecasting System (BRIFS), developed in collaboration with AEMET and PortsIB from the Balearic Government, is a critical component of SOCIB's operational capabilities, providing an essential early warning system for risk management at the Ciutadella Harbor. BRIFS delivers 48-hour forecasts of rissaga events supporting proactive measures to mitigate potential impacts caused by meteo-tsunamis (i.e. rissagas, local term). Beyond its operational role, BRIFS serves as a valuable research tool, contributing to a deeper understanding of the complex oceanographic and atmospheric mechanisms driving rissaga formation. This action ensures the continuous, near-real-time availability of BRIFS forecasts, targeting a 90% forecast availability rate annually. It also includes ongoing system updates, maintenance, and annual performance evaluations, documented in comprehensive reports, to ensure BRIFS remains a reliable and effective tool for both forecasting and scientific advancement.	At least 90% of the days per year providing 48 h rissaga forecast

Action	Indicator
A.2.2.3. Updating and maintenance of the Autonomous Wave Forecasting System (SAPO): The Autonomous Wave Forecasting System (SAPO), operated in collaboration with Puertos del Estado, is a key operational tool for wave prediction in the Balearic Islands, supporting coastal management, navigation safety, and research. This action focuses on ensuring its continuous updating and maintenance to provide at least 24-hour forecasts for 90% of the days per year. Additionally, system performance will be monitored through annual evaluations, assessing its functionality and efficiency. SAPO will continue to evolve, integrating technological advancements to enhance its predictive capabilities and support decision-making in marine and coastal environments, and in particular enhancing maritime safety and supporting operational needs in the area of the Cabrera National Park.	At least 90% of days per year providing, at least, 24 h prediction of the Balearic Islands operative.
Strategy 2.3: Update, renew, and maintain ICTS SOCIB's data infrastructure	
A.2.3.1. Enhancement and maintenance of SOCIB's software infrastructure: ICTS SOCIB is committed to continuously improving its software applications to maximize performance, compatibility, security, and efficiency. Corrective maintenance will address bugs and errors, while evolutionary maintenance will enhance features to meet changing user needs and technological advancements. A key focus will be the integration of essential tools—such as the indexer, data API, API management, and database—into Continuous Integration/Continuous Deployment (CI/CD) processes. This automation will streamline software building, testing, and deployment, improving reliability and development speed. The integration process will be carried out progressively, ensuring continuous optimization and adaptation to technological advancements. The Catalog of Tools for Data Management and Additional Applications will serve as a comprehensive reference for the software ecosystem supporting SOCIB's infrastructure.	At least 12 of software applications integrated into CI/CD process.
A.2.3.2. Development of new functionalities and redesign SOCIB data processing system: New functionalities and developments will be implemented within the data management tools to meet evolving user needs and align with international standards. Efforts will focus on progressively integrating key processes, such as the glider data process into the ICTS SOCIB Process Application, updating the Instrumentation tool, developing a new version of the Management Database, and renewing the ICTS SOCIB Data Management & Processing Tools. This continuous evolution will enhance system efficiency, interoperability, and adaptability to technological advancements.	At least 4 new major functionalities implemented.
Strategy 2.4: Enhance data quality control, FAIR level, and ensure alignment with international standards	
A.2.4.1. Improvement of existing and develop new Data Management Plans of the observing programs: ICTS SOCIB will make a significant effort to provide clear documentation on data collection, storage, processing, and sharing, ensuring consistency, efficiency and transparency in the data management processes, advancing towards automated Data Management Plans. Moreover, DMPs will aid in onboarding new team members, streamlining workflows, and maintaining alignment with international standards. In line with SOCIB's Open Science Policy (A.4.1.4), these Data Management Plans will integrate FAIR principles (Findable, Accessible, Interoperable, and Reusable) to enhance data accessibility and interoperability. Additionally, they will support the long-term preservation and reuse of scientific data, key elements for AI, fostering collaboration and maximizing the impact of SOCIB's research outputs within the global scientific community.	At least 8 Data Management Plans developed and published in SOCIB corporate website.

Action	Indicator
A.2.4.2. Incorporation and updating the quality-controlled FAIR data products into the ICTS SOCIB Data Catalog: ICTS SOCIB aims to enhance the FAIRness, accessibility, discoverability, interoperability, and reusability, of its metocean data by incorporating new data products into its catalog and developing a robust DOI strategy. The DOI strategy will be redefined to ensure alignment with international standards. Additionally, new data products will be progressively integrated, including updates for HFR data, gliders, surface drifters, and derived datasets. This effort strengthens data traceability, citation, and long-term accessibility while reinforcing SOCIB's commitment to Open Science and Open Data principles.	At least 6 new data products incorporated with DOI.
A.2.4.3. Renewal and enhancement of the CoreTrustSeal certification: SOCIB will undertake the renewal and enhancement of its CoreTrustSeal certification to ensure the long-term reliability, accessibility, and trustworthiness of its data repository. This process will involve updating policies and procedures to meet the latest certification requirements, improving metadata quality, strengthening data preservation strategies, and enhancing interoperability with international research infrastructures. An internal assessment will be conducted to update the data management framework, followed by the completion of the certification renewal. This effort reinforces SOCIB's commitment to FAIR principles, Open Science, and best practices in data stewardship.	Maintenance of the CoreTrustSeal certification during the period.

2.4.3.3. Specific actions addressing Objective 3

To ensure the implementation of the **4 strategies** related to Objective 3. Enhance open access to outstanding facilities, services, and scientific and technical contributions to foster ocean research and innovation, the following **10 actions**, described below, have been defined.

Table 7. Specific actions addressing Objective 3.

Action	Indicator
Strategy 3.1: Promote the access, use and traceability of data through the SOCIB outstanding facility	
A.3.1.1. Optimization of the user registration system for data access across all SOCIB entry points to SOCIB outstanding facility: The user registration system will be improved to enhance the tracking of user demands and provide a comprehensive understanding of the reach and impact of the meteorological and oceanographic data within the SOCIB Metocean Data Repository & RI System, as an outstanding facility. This enhancement will enable the segmentation of users and the analysis of demonstrated demand for both data and data products and will be aligned with similar EU driven initiatives (such as for example, EMODnet & Copernicus Marine Service). The registration system will be fully integrated into SOCIB's digital ecosystem, ensuring seamless interoperability across platforms, considering that data access is provided through the SOCIB Data Catalog, Data API, or THREDDS Data Server, following user registration.	100% optimization features implemented in the SOCIB Metocean Data Repository.

Action	Indicator
A.3.1.2. Definition of the Traceability Strategy for SOCIB's Metocean Data: A traceability strategy will be defined to ensure the proper identification, tracking, to ensure the identification, provenance, integrity, tracking, and proper reuse of meteocean data in various scientific and operational contexts. The objective is to develop a structured approach that aligns with Open Science and Open Data principles ensuring compliance with FAIR data practices and best practices for data repository management. Firstly, a content analysis will be conducted to assess existing practices, challenges and gaps in data traceability. The strategy will be fully defined incorporating key elements such as metadata management DOI assignment standardized nomenclature resource minting provenance management and agreements to enhance interoperability. A progressive and structured integration of traceability mechanisms will help to identify solutions and best practices for long-term data preservation accessibility and interoperability within global research infrastructures. aligning SOCIB's efforts with international standards and reinforcing its commitment to high-quality data management.	100% of the traceability strategy designed, with at least 2 key actions implemented.
A.3.1.3. Improvement of functionalities of ICTS SOCIB Data Catalog: The ICTS SOCIB Data Catalog will be improved, through the development of new functionalities responding to users needs. In 2025, the focus will be on improving research filters and vocabularies in order to ensure clarity and consistency in data descriptions and allow users to efficiently find relevant datasets. In the following years, the effort will concentrate on adding new data types into the Data Catalog (Model data, images, etc.). Finally, in 2028, a Product User Manual will be developed. These enhancements will empower users to make better use of the data catalog, driving greater engagement, collaboration, and impact.	100% of advanced functionalities implemented and at least 2 new data types incorporated.
Strategy 3.2: Ensure competitive access to ICTS SOCIB's facilities	
A.3.2.1. Launch of new competitive access calls for gliders: SOCIB will enhance scientific competitive access to its glider fleet by launching at least one new competitive access call annually, ensuring that at least 20% of the fleet is allocated through a structured, transparent system. These open calls, published on the official website, aim to provide fair and equal opportunities for researchers and institutions, fostering innovative, high-impact projects with state-of-the-art glider technology. To support these launches, SOCIB will also conduct promotional activities—such as newsletters, workshops, or conferences—to raise awareness among the scientific and operational oceanography communities (see 2.8. New Outstanding Facilities proposal).	At least 20% competitive access to the glider fleet.
A.3.2.2. Design future open access to SOCIB Research Vessel: SOCIB will promote open access to its coastal Research Vessel, whose unique characteristics and equipment enable the scientific community to carry out a wide range of research campaigns. This makes it a highly attractive and sought-after facility for conducting studies in the Balearic Sea environment. To facilitate this access, SOCIB will establish a comprehensive open access protocol, outlining clear guidelines for proposal submission, evaluation, and selection. A key element of this protocol will be the creation of an External Access Committee, responsible for selecting the most scientifically outstanding proposals. In line with its commitment to open and competitive access, SOCIB, additionally, will work towards the inclusion of the R/V SOCIB in the Spanish Oceanographic Fleet (ICTS FLOTA), reinforcing its role as a key research infrastructure within the national and international scientific community.	100% of the open access protocol designed and external access committee created to SOCIB Research Vessel.

Action	Indicator
A.3.2.3. Structuring and improving competitive access to SOCIB's facilities and services: As an ICTS, SOCIB is defined by its commitment to open and competitive access to its facilities and services. To ensure this principle is upheld, particularly with the integration of digital twins as outstanding facilities, the creation of an Access Unit within SOCIB's organizational structure is proposed. This unit will be responsible for coordinating, managing, and optimizing access procedures while strengthening promotion and communication with users. Key milestones include reviewing and updating current procedures to align with strategic and regulatory requirements, developing an integrated digital platform to facilitate the application, evaluation, and monitoring of access, and launching communication campaigns to enhance the visibility of access opportunities. Additionally, governance mechanisms will be reinforced with metrics to assess impact and user satisfaction. Furthermore, based on the assigned human resources, this initiative also considers the potential incorporation of the SOCIB Research Vessel and the Beach Monitoring Facility as outstanding facilities, among other facilities. This would reinforce SOCIB's capacity to provide competitive access to key observational and digital resources, further supporting coastal and marine research and management. This initiative aims to enhance the efficiency and transparency of competitive access, increase the number and diversity of users, optimize internal management through digital tools, and ensure alignment with SOCIB's strategic objectives and the III Addendum.	100% of the Access Unit created.
Strategy 3.3: Foster research excellence aligned with SOCIB mission and vision	
A.3.3.1. Publication of high-impact research on ocean science and technology: This action focuses on executing and disseminating cutting-edge research in areas directly related to SOCIB Mission through publication in high-impact, peer-reviewed journals. The publications will cover a range of critical topics, always aligned with the mission and vision and for example including ocean variability (e.g., spatio-temporal dynamics of biochemical processes and mesoscale eddies), global change (e.g., coastal ocean response to climate change, impacts of extreme events like marine heatwaves and extreme storms, i.e. medicanes), operational oceanography, ocean integration, and digital twins. This action aims to generate high-quality scientific output, advance our understanding of ocean processes, enhance SOCIB's scientific reputation, and foster international collaboration in ocean research, always aligned with the mission and objectives.	At least 10 publications per year.
A.3.3.2. Key participation in R&D&I forums, conferences and congresses: This action promotes active participation in national and international R&D&I forums, conferences, and congresses related to ocean science and technology. SOCIB will contribute by presenting research, delivering invited talks, organizing sessions, and networking to forge collaborations. This engagement facilitates knowledge exchange, disseminates SOCIB's expertise, and keeps researchers abreast of advancements in areas directly related to SOCIB mission. Ultimately, this action aims to enhance SOCIB's international recognition, strengthen partnerships, and position its research at the forefront of ocean science and technology.	At least 15 oral talks per year.

Action	Indicator
Strategy 3.4: Encourage ICTS SOCIB's leadership in national and international collaborations	
A.3.4.1. Strengthening strategic partnerships and research networks: SOCIB will enhance local, regional, national, and international research key networks by fostering public and private collaborations with well-established and influential R&D&I entities. Key strategic partnerships will be established and formalized through documented agreements (including, e.g. Mercator Ocean International, the National Oceanographic Institute (UK), and initiatives such as CoastPredict), to advance scientific and technological innovation. These strategic partnerships will facilitate joint research projects, promote data sharing, and drive technological development. Furthermore, SOCIB will reinforce its commitment to education and knowledge transfer through collaborations with academia, such as the cooperation agreement with the Universitat de les Illes Balears (UIB) within the new Marine Sciences Degree framework. By actively engaging in these networks and fostering new synergistic partnerships, SOCIB will solidify its position as a key player in marine technical and scientific research and Digital Twins, maximizing its research impact and contributing to advancements in ocean science and technology.	At least 4 strategic collaborations at the regional, national, and international levels established.
A.3.4.2. Engagement in joint scientific and technical initiatives with ICTS: This action promotes collaboration with other Spanish Unique Scientific and Technical Infrastructures (ICTS) to advance shared research priorities in ocean science, technology, and knowledge transfer. SOCIB will selectively engage in joint initiatives with key ICTS, focusing on mutually beneficial areas of expertise. The goal is to strengthen the ICTS network, enhance the visibility and projection of the ICTS brand, and promote collaboration, communication, and capacity-building initiatives, also leveraging combined resources and expertise to enhance data accessibility, support joint projects, and explore opportunities for knowledge transfer. In addition to scientific and technological collaboration, this initiative will include joint communication efforts, training and capacity-building programs, and technology transfer activities, ensuring that the knowledge generated is effectively disseminated and applied. Through these alliances, SOCIB aims to maximize innovation, foster interdisciplinary cooperation, and reinforce the impact of the ICTS network on national and international research. This will also contribute to enhancing the scientific competitive access to SOCIB Research Infrastructures.	At least 3 joint scientific and technical initiatives with national ICTS.

2.4.3.4. Specific actions addressing Objective 4

The following **12 actions**, described below, will contribute to carrying out the **4 strategies** aligned with Objective 4. Reinforce knowledge transfer, corporate communication, and strategic planning to enhance SOCIB's institutional impact.

Table 8. Specific actions addressing Objective 4.

Action	Indicator
Strategy 4.1: Increase knowledge transfer to strategic users and sectors	
A.4.1.1. Conduction of a socioeconomic impact study of the ICTS SOCIB: A.4.1.1. Conduction of a socioeconomic impact study of the ICTS SOCIB: This action focuses on carrying out a detailed analysis of the socioeconomic impact of ICTS SOCIB over the past 15 years, evaluating its contributions in various areas such as decision-making, support for public policies, participation in outreach or environmental awareness programs, among others. It will also include an analysis of the potential impact of digital twins on strategic sectors. The study involves the development of a roadmap outlining the phases, objectives, and methodologies necessary for its implementation, as well as a preliminary analysis that will identify key indicators, trends, and priority areas for improvement.	100% of the socioeconomic impact study report completed and published on the corporate website.
A.4.1.2. Implementation of "Working Backwards" protocol to SOCIB's digital applications: Ensure that all SOCIB digital applications are purpose-driven by integrating clear PRFAQ (Press Release and Frequently Asked Questions) procedures. This action includes establishing an integrated internal structure to enhance collaboration, efficiency, and impact. By adopting the "Working Backwards" protocol for developing new digital applications, specific user requirements and strategic sector needs will be rigorously considered. This approach guarantees that each digital solution is tailored, effective, and fully supports SOCIB's goals.	100% of Working backwards Protocol to SOCIB's digital applications.
A.4.1.3. Strengthening training of future generations: SOCIB will contribute to the training of future professionals, researchers and technicians, through a structured tutoring and mentoring program in particular with the Universitat de les Illes Balears (UIB) and other academic institutions. This initiative, integrated into relevant teaching activities aligned with SOCIB's mission (e.g., Marine Sciences, Physics, Computer Science, Artificial Intelligence), will offer curricular and extracurricular internships, fostering active student engagement and providing practical experience. Furthermore, SOCIB will supervise Bachelor's, Master's, and doctoral theses, facilitate joint training activities, and expand training opportunities and knowledge transfer in marine sciences and technologies by reinforcing existing agreements and establishing new collaborations with national and international academic institutions.	At least 20 students supervised.
A.4.1.4. Design and implementation of SOCIB's Institutional Open Science Policy: This action focuses on developing tools and policies that formalize ICTS SOCIB's commitment to Open Science, including the creation of an institutional policy and the completion of the Institutional Repository, incorporating advanced functionalities to enable the management and open access to scientific, technical, and outreach data, as well as publications and resources. Additionally, it will align with the CSIC Code of Good Scientific Practices and promote responsible research assessment in accordance with DORA and CoARA, of which SOCIB has been a member since 2022.Furthermore, data management plans will be implemented to support researchers in ensuring the integrity, accessibility, and long-term preservation of their data, the CoreTrustSeal certification will be renewed, and an analysis will be conducted to establish traceability mechanisms for resources.All these initiatives will be aligned with the National Open Science Strategy and international standards.	100% of the Institutional Open Science Policy designed and approved.

Action	Indicator
Strategy 4.2: Strengthen SOCIB's visibility, positioning, institutional reputation through digital optimization, strategic content creation, and impactful public engagement	
A.4.2.1. Optimization of the functionality and experience of external and internal users of the corporate website: The goal is to optimize content, incorporate interactive functionalities, and increase the visibility and accessibility of data, services, and activities of ICTS SOCIB. For internal users, specific tools will be developed to facilitate efficient management of content, information, and data, as well as quick access to internal resources and enhanced collaboration among teams, strengthening operability and productivity. This process will include the publication and awarding of new developments, which will subsequently be implemented to ensure the website becomes a key platform for knowledge transfer, interaction with external users, and comprehensive support for internal needs.	100% of the developments and new functionalities tendered, implemented and operational.
A.4.2.2. Creation and publication of high-quality information, outreach, and educational content and resources: The objective is to develop graphic and audiovisual materials that highlight the scientific, technical, and outreach programs of ICTS SOCIB as a Research Infrastructure, maximizing their impact on users. These resources will include audiovisuals showcasing the facilities and digital twin prototypes, immersive visual content adapted to innovative platforms like the Science on a Sphere (SoS), and an interactive guide to inspire careers in marine sciences and ocean technologies. These materials will be key to connecting with diverse audiences, improving the communication of activities, and strengthening the institutional image of ICTS SOCIB as a Singular Scientific and Technical Infrastructure (ICTS), ensuring a significant impact on users by facilitating access to valuable information and fostering engagement.	At least 4 high quality resources created.
A.4.2.3. Organization of activities and events with impact in the areas of knowledge transfer, communication, dissemination and training: SOCIB will organize and participate in national and international activities to promote knowledge transfer, communication, outreach, and training. These initiatives will showcase the impact of the institution's scientific and technical programs while fostering interdisciplinary collaboration. Activities will include the open house event of the SOCIB Oceanographic Vessel as part of the European Researchers' Night, open house sessions with interactive demonstrations such as Science on a Sphere (SoS), participation with a corporate stand at the Transfiere Forum, and the organization of a national outreach contest focused on ocean conservation.	At least 4 impact activities developed.
A.4.2.4. Development and execution of media outreach and science communication strategies: This action focuses on enhancing the visibility of ICTS SOCIB in local, national, and international media, positioning it as a reference source in its field of research and knowledge transfer. Initiatives will highlight SOCIB's activities, scientific advancements, and technological innovations, showcasing key research programs, knowledge transfer efforts, and outreach initiatives. The objective is to reinforce SOCIB's role in fostering public engagement with marine and coastal sciences.	At least 4 appearances in regional, national and international media ensured.

Action	Indicator
Strategy 4.3: Promote communication, citizen science, and dissemination of coastal and marine science and SOCIB Digital Twins	
A.4.3.1. Installation, commissioning and development of the Science on a Sphere (SoS) outreach space: The Science on a Sphere (SoS) outreach space will be installed and optimized at the new ICTS SOCIB headquarters as a key tool for promoting ocean literacy. This space will feature an innovative system offering interactive content and activities tailored to diverse audiences and strategic users. The process will include the publication of the system's tender, followed by its assembly and installation to ensure proper functionality and adaptability. Additionally, an initial outreach plan will be developed to maximize awareness of the importance of the Mediterranean and the ocean. As part of the program, and within personnel possibilities (formal acceptance of new positions) thematic activities will be organized for the general public, the educational community, and policymakers, fostering public engagement and interactive learning.	100% of the SoS System installed and operational.
A.4.3.2. Implementation of the Communication and Training Plan of SOCIB Digital Twins: A communication and training plan will be developed and implemented, targeting key populations of the digital twins to enhance awareness and promote the use of these applications among strategic actors. This plan will include the design of the structure and development of content for a MOOC (Massive Open Online Course) on digital twins in collaboration with international key players These actions will ensure effective knowledge transfer, fostering collaboration and the adoption of these digital tools by strategic users. Importantly, this dissemination plan is specifically aimed at stakeholders who are not directly involved in the co-design process, ensuring broader engagement and facilitating the integration of digital twin applications across different user groups.	1 MOOC on digital twins created.
Strategy 4.4: Strengthen institutional planning and organizational transformation	
A.4.4.1. Implementation of advanced strategic planning tools: Innovative tools and methodologies will be developed and implemented to improve strategic planning processes, ensuring greater alignment with the objectives of the 2025–2028 Strategic Plan, annual plans, and Multiannual Plans. This will include the implementation of a Balanced Scorecard with structural metrics and a collaborative tool for strategic planning and institutional reporting, optimizing the automatic generation of reports, documents, graphics, and statistics.	At least 2 advanced tools implemented.
A.4.4.2. Promotion of organizational transformation, collaborative leadership, and adaptive governance: Develop an Organizational Transformation Plan to implement initiatives that strengthen the internal culture of ICTS SOCIB, promote collaborative leadership, encourage continuous professional development, and ensure the inclusion of gender equality principles in its institutional structure and strategy. These actions seek to align the organization with the requirements of the 3rd Addendum and the implementation of the Mediterranean Digital Twin Outstanding Facility, consolidating an inclusive and equitable institutional governance. The process will begin with the development of the Organizational Transformation Plan and an organizational diagnosis. This will be followed by the implementation of the Collaborative Leadership Program, fostering a culture of teamwork and shared decision-making. Finally, an analysis of the institutional culture will be conducted from a gender perspective, ensuring a more inclusive and equitable framework for the future.	At least 50% of the measures contemplated in the Organizational Transformation Plan implemented.

2.4.3.5. Specific actions addressing Objective 5

To effectively implement the **3 strategies** connected to Objective 5. O5. Strengthen organizational structure, promote professional development, and improve corporate management quality to enhance institutional efficiency, the following **8 actions**, described below, will be undertaken.

Table 9. Specific actions addressing Objective 5.

Action	Indicator
Strategy 5.1: Promote an organization that fosters collaboration, talent attraction, and career development	
A.5.1.1. Implementation of the Human Resources Plan: Execution of the Human Resources Plan, including staff training, performance evaluation, and working condition improvements, with continuous monitoring for adjustments. Key actions include the development of structural job descriptions aligned with SOCIB's strategic objectives, optimization of onboarding and offboarding protocols, design of a performance evaluation protocol, and creation of a conflict management protocol to foster a collaborative work environment.	100% of the Human Resources Plan implemented.
A.5.1.2. Execution of the I Gender Equality Plan: Execute the measures outlined in the Gender Equality Plan to promote workplace equity, work-life balance, and inclusion. Key actions include mandatory training programs on gender equality to address biases, the development of an Inclusive Language Manual to promote diverse and inclusive communication, and the creation of an LGTBI Equality Plan to ensure non-discrimination and visibility within the organization.	100% of the actions from the Gender Equality Plan implemented.
A.5.1.3. Rollout of the ICTS SOCIB Staff Training Plan: Execute the training plan to enhance the technical, scientific, and transversal skills of SOCIB staff through targeted training in key areas such as moral harassment prevention, CPR, languages, occupational risk prevention (ORP), and leadership. Additionally, staff will be encouraged to pursue specific training aligned with their roles to support professional development.	At least 20 training actions from the Training Plan implemented.
A.5.1.4. Adoption of the I Remote Work Plan: Implement the Remote Work Plan to enhance remote work practices within the organization by establishing clear policies and procedures, providing the necessary technological tools, and offering digital skills training. The plan will include measures to ensure productivity, information security, and employee well-being, fostering flexibility and improving work-life balance. The initial phase will focus on creating the framework and resources, followed by periodic evaluations to refine and improve its implementation and effectiveness.	100% of the I Remote Work Plan implemented.
Strategy 5.2: Optimize and digitalize administrative, management, and communication procedures	
A.5.2.1. Rollout of the Task Management System: A task management system will be implemented to enhance the planning, tracking, and allocation of activities, addressing emerging needs such as interdepartmental coordination and agile project management. This tool will improve team communication, deadline monitoring, and task prioritization. The system will be gradually implemented across the organization.	100% of the task management system implemented to all ICTS SOCIB areas.
A.5.2.2. Development of the ICTS SOCIB Intranet: A corporate intranet will be developed to centralize information, improve internal communication, and optimize administrative and HR processes. Key sections will include news, documentation, staff resources, protocols, and access to corporate tools like the time-tracking system. The intranet will be designed, tested, and launched with staff training, followed by continuous updates to enhance functionality and address emerging needs.	100% of the intranet implemented.

Action	Indicator
A.5.2.3. Implementation of an Enterprise Resource Planning (ERP): The ERP will be a specialized management software well tailored for research institutions and ICTS, streamlining project management, finance, HR, and administrative processes, to help optimize workflows, compliance, and data integration at SOCIB. The implementation will involve integrating the ERP with existing systems, customizing its configuration to meet SOCIB's strategic needs, and ensuring its alignment with operational goals.	100% of the ERP software implemented.
Strategy 5.3: Adapt ICTS SOCIB to the National Security Framework	
A.5.3.1. Implementation of the Specific Compliance Profile (SCP) for Essential Security Requirements of the National Security Framework: The measures defined in the SCP will be implemented to ensure compliance with the Essential Security Requirements, strengthening the protection of SOCIB's information, infrastructure, and systems. This will include specific actions for the assessment, updating, and monitoring of the implemented measures to ensure their effectiveness and alignment with current regulations.	100% of the items in the SCP for Essential Security Requirements implemented.

2.4.3.6. Specific actions addressing Objective 6

The execution of the following **7 actions** will facilitate the implementation of the **2 strategies** associated with Objective 6. Ensure the long-term sustainability of ICTS SOCIB and successfully commission the new headquarters.

Table 10. Specific actions addressing Objective 6.

Action	Indicator
Strategy 6.1: Ensure the operability of SOCIB's new headquarters with connectivity, equipment, and an efficient relocation	
A.6.1.1. Installation of the Global Research Network RedIRIS at SOCIB's New Headquarters: Ensure connectivity to RedIRIS through a process that includes a priori analysis of installation, maintenance, and operational requirements, followed by the installation and configuration of the necessary infrastructure. This approach will be carried out in close collaboration with RedIRIS and UIB, and will facilitate access to the global research network and enhance the scientific collaboration capacity of the ICTS SOCIB.	100% of the Human Resources Plan implemented.
A.6.1.2. Provision of furniture and scientific equipment for the New Headquarters: Equip the common spaces, laboratories, and outreach areas of the new headquarters with the necessary furniture, equipment, and services to ensure functionality, comfort, and operability for all planned activities. This includes the acquisition, installation, and setup of furniture and scientific equipment in common spaces and laboratories, the design, fabrication, and installation of signage and labeling to ensure visibility and consistency with SOCIB's corporate identity, the establishment of a customs warehouse by managing the required permits and adaptations to comply with current regulations, and the integration of Net Zero principles by prioritizing the use of sustainable materials, energy-efficient equipment, and environmentally responsible procurement to reduce emissions and promote a low-carbon, resource-efficient infrastructure.	100% of the actions from the Gender Equality Plan implemented.

Action	Indicator
A.6.1.3. Relocation of staff, equipment, and resources to the New Headquarters: Develop and execute a plan for the efficient and organized relocation of staff, equipment, and resources to the new headquarters. This will include the design and coordination of a detailed relocation plan, ensuring logistical organization, space preparation, and minimal disruptions to SOCIB activities. The relocation process will prioritize maintaining operational continuity and ensuring full functionality of the new facilities.	At least 20 training actions from the Training Plan implemented.
A.6.1.4. Implementation and expansion of IT Services in the new SOCIB Headquarters: This action focuses on the establishment, modernization, and expansion of IT services to ensure efficient digital infrastructure and secure data management in the new SOCIB headquarters. It includes the deployment of online services to optimize accessibility and operational efficiency, as well as the acquisition of software licenses to support scientific and administrative activities. The plan also involves the procurement of IT equipment, including general computing infrastructure, to enhance system performance. To strengthen data security and storage capabilities, this action will support the expansion of the remote backup system at IMEDEA, the implementation of a cloud-based backup system, and the upgrade of additional user storage at the IMEDEA Data Center. Additionally, the Cloud Replicate DC (Phase 2) will be carried out to ensure redundancy and resilience in SOCIB's digital infrastructure. These efforts will enhance IT service continuity, data integrity, and overall system performance in the new headquarters.	100% of the I Remote Work Plan implemented.
Strategy 6.2: Strengthen SOCIB's governance and long-term sustainability through collaboration with CSIC and UIB and the modernization of its institutional framework (statutes)	
A.6.2.1. Contribution to the design of an Ocean Observing National Strategy: Maintain and enhance the long-standing collaboration and coordination with CSIC/ UTM in relation to data and R/V and expand towards multi-platform observing infrastructures. Contribute to the development, with CSIC UTM and CSIC IEO of a strategic initiative, such as a Spanish Ocean Observing Data and Digital National Strategy, aligned with similar international initiatives (FROOS, IMOS, etc.). This process will include a revision of existing initial proposals for joint UTM-SOCIB initiatives (2020-2022) and an updated analysis to evaluate the feasibility of a joint venture between SOCIB and UTM to enhance the existing capacities and the visibility of SOCIB and CSIC technical and scientific ocean observing work force. Potential partial integration (possibly as a joint ICU) in CSIC structure identifying strengths, weaknesses, opportunities, and required resources will be analysed. If all institutions are well aligned , a comprehensive integration proposal will be developed, defining the mechanisms of collaboration, areas of cooperation, and strategic benefits. Subsequently, if aligned with CSIC, Ministry and CAIB priorities, an Ocean Observing, Data and Digital National Strategy proposal will be designed, outlining actions, resources, and timelines.	100% of the Proposal for the design of an Ocean Observing, Data and Digital National Strategy developed.
A.6.2.2. Incorporation of UIB into SOCIB's Governance Bodies: SOCIB will propose to include UIB representatives in the governance of the Consortium to foster synergies in research, education, and innovation, enhancing joint projects with regional impact and strengthening SOCIB's influence within the Mediterranean scientific community. This will involve the development of a formal proposal, followed by the integration of UIB representatives into governance structures (Executive Commission and Board of Trustees), ensuring alignment with the Consortium's strategic objectives and its long term sustainability.	100% of the Proposal to the Governance Bodies of SOCIB of the incorporation of UIB designed.

Action	Indicator
A.6.2.3. Update of the ICTS SOCIB Statutes to assure sustainability, enhance governance, adaptability, and strategic alignment: The ICTS SOCIB statutes, most of which have remained unchanged since 2007, require a comprehensive update for long term sustainability and to align with current strategic objectives, the III Addendum, and the implementation of the ocean digital twin as an essential facility. This revision should modernize SOCIB's legal framework, ensuring the adaptability of areas to the evolving needs of the digital twins of the ocean and related research infrastructures. The updated statutes will reinforce governance, revising &/or updating the existing 3 areas and also proposing a new Associated Director position to facilitate the integration of digital twin components, and enhance knowledge transfer, open science, and innovation. Additionally, they will ensure compliance with the Spanish Strategy for Science, Technology, and Innovation, and international programs such as Horizon Europe and the ESFRI Roadmap, positioning SOCIB as a reference in marine research and innovation.	Updated statute proposal submitted to the Governance Bodies.

2.4.4. Resources

The Strategic Plan 2025–2028 is underpinned by a comprehensive financial framework detailed in the Third Addendum to the Agreement between the Ministry of Science and Innovation and the Government of the Autonomous Community of the Balearic Islands, published in the Official State Gazette (BOE-A-2023-15222) on June 29, 2023. This addendum secures a **total funding commitment of 93.4 M€ for the 2024–2033 period**, ensuring the continued growth, sustainability, and operational excellence of SOCIB's activities.

For the **2025–2028 period**, a total allocation of **37.4 M€** structural funds will be dedicated to advancing SOCIB's strategic objectives. Of this, 12.8 M€ will be invested in enhancing infrastructure, observation, and forecasting systems, as well as developing SOCIB Digital Twins —high-resolution models crucial for monitoring and simulating complex oceanic and coastal processes. The remaining **24.6 M€** will support **personnel and operational costs**, ensuring the expertise and resources necessary for the effective implementation of these initiatives.

The **planned investments** in the **SOCIB Strategic Plan 2025-2028** amount to a total of **14.7 M€**, which includes 12.8 M€ from structural funds and an additional 1.9 M€ from competitive funding calls (see 2.6. Investment Plan). These resources will be distributed attending the three investment types as required in the investment plan (2.6. Investment Plan): 9.7 M€ will be allocated to maintaining the operability and capabilities of the SOCIB RI System Outstanding Facility while preventing obsolescence (type 1). Additionally, 2.0 M€ will be dedicated to expanding and improving its capacities, ensuring it remains at the forefront of technological and scientific advancements developing SOCIB Digital Twins (type 2). Lastly, 3.0 M€ will be invested in other strategic initiatives, further supporting the development, sustainability, and efficiency of these critical scientific and technological infrastructures (type 3).

All investments in this plan are **high priority**, directly addressing critical needs identified for carrying out the actions outlined in the strategic plan, such as upgrading aging infrastructure, enhancing research capabilities, and ensuring SOCIB's continued operation and competitiveness. SOCIB has secured the necessary funding to support these high-priority investments, ensuring their feasibility and timely implementation.

These resources will empower ICTS SOCIB to expand its scientific, technological, and societal contributions, ensuring its position as a leader in marine research, data accessibility, and community engagement.

[2.5.] SCHEDULE AND FOLLOW-UP

[2.5.1.] Schedule

The following schedule outlines the timeline for the period at the action level.

Table 11. Schedule of the 2025-2028 period by action.

Action		25	26	26	28
A.1.1.1.	Co-design of the Digital Twin of a Marine Protected Area - the case of Cabrera National Park				
A.1.1.2.	Development of the Digital Twin prototype of a Marine Protected Are a- the case of Cabrera National Park				
A.1.1.3.	Testing and validation of the Digital Twin of a Marine Protected Area - the case of Cabrera National Park				
A.1.2.1.	Co-design of the Digital Twin for Climate change adaptation planning - the case of Cala Millor urban beach				
A.1.2.2.	Development of the Digital Twin prototype for Climate change adaptation planning - the case of Cala Millor urban beach				
A.1.2.3.	Testing and validation of the Digital Twin for Climate change adaptation planning - the case of Cala Millor urban beach				
A.1.3.1.	Adapting SOCIB's observing system to support the development of the Digital Twins of the Ocean				
A.1.3.2.	Adapting SOCIB's forecasting system to support the development of the Digital Twins of the Ocean				
A.1.3.3.	Development of AI capabilities and expertise for improved ocean observation and forecasting in Digital Twins of the Ocean				
A.2.1.1.	Renewal of the Glider fleet and equipment				
A.2.1.2.	Enhancement, optimization, and continuous monitoring of the HF Radar				
A.2.1.3.	Ensuring continuous data collection with Lagrangian platforms				
A.2.1.4.	Upgrade and maintenance of Beach Monitoring platforms				
A.2.1.5.	Implementation of the Satellite Facility				
A.2.1.6.	Modernization of SOCIB's equipment pool for operations				

Action		25	26	26	28
A.2.2.1.	Continuous improvement and sustainability of the Western Mediterranean Operational Forecasting System (WMOP)				
A.2.2.2.	Optimization and continuous operation of the Balearic Rissaga Forecasting System (BRIFS)				
A.2.2.3.	Updating and maintenance of the Autonomous Wave Forecasting System (SAPO)				
A.2.3.1.	Enhancement and maintenance of SOCIB's software infrastructure				
A.2.3.2.	Development of new functionalities and redesign SOCIB data processing system				
A.2.4.1.	Improvement of existing and develop new Data Management Plans of the observing programs				
A.2.4.2.	Incorporation and updating the quality-controlled FAIR data products into the ICTS SOCIB Data Catalog				
A.2.4.3.	Renewal and enhancement of the CoreTrustSeal certification				
A.3.1.1.	Optimization of the user registration system for data access across all SOCIB entry points to SOCIB outstanding facility				
A.3.1.2.	Definition of the Traceability Strategy for SOCIB's Metocean Data				
A.3.1.3.	Improvement of functionalities of ICTS SOCIB Data Catalog				
A.3.2.1.	Launch of new competitive access calls for gliders				
A.3.2.2.	Design future open access to SOCIB Research Vessel				
A.3.2.3.	Structuring and improving competitive access to SOCIB's facilities and services				
A.3.3.1.	Publication of high-impact research on ocean science and technology				
A.3.3.2.	Key participation in R&D&I forums, conferences and congresses				
A.3.4.1.	Strengthening strategic partnerships and research networks				
A.3.4.2.	Engagement in joint scientific and technical initiatives with ICTS				
A.4.1.1.	Conduction of a socioeconomic impact study of the ICTS SOCIB				
A.4.1.2.	Implementation of "Working Backwards" protocol to SOCIB's digital applications				
A.4.1.3.	Strengthening training of future generations				
A.4.1.4.	Design and implementation of SOCIB's Institutional Open Science Policy				
A.4.2.1.	Optimization of the functionality and experience of external and internal users of the corporate website				
A.4.2.2.	Creation and publication of high-quality information, outreach, and educational content and resources				
A.4.2.3.	Organization of activities and events with impact in the areas of knowledge transfer, communication, dissemination and training				

Action		25	26	26	28
A.4.2.4.	Development and execution of media outreach and science communication strategies				
A.4.3.1.	Installation, commissioning and development of the Science on a Sphere (SoS) outreach space				
A.4.3.2.	Implementation of the Communication and Training Plan of SOCIB Digital Twins				
A.4.4.1.	Implementation of advanced strategic planning tools				
A.4.4.2.	Promotion of organizational transformation, collaborative leadership, and adaptive governance				
A.5.1.1.	Implementation of the Human Resources Plan				
A.5.1.2.	Execution of the I Gender Equality Plan				
A.5.1.3.	Rollout of the ICTS SOCIB Staff Training Plan				
A.5.1.4.	Adoption of the I Remote Work Plan				
A.5.2.1.	Rollout of the Task Management System				
A.5.2.2.	Development of the ICTS SOCIB Intranet				
A.5.2.3.	Implementation of an Enterprise Resource Planning (ERP)				
A.5.3.1.	Implementation of the Specific Compliance Profile (SCP) for Essential Security Requirements of the National Security Framework				
A.6.1.1.	Installation of the Global Research Network RedIRIS at SOCIB's New Headquarters				
A.6.1.2.	Provision of furniture and scientific equipment for the New Headquarters				
A.6.1.3.	Relocation of staff, equipment, and resources to the New Headquarters				
A.6.1.4.	Implementation and expansion of IT Services in the new SOCIB Headquarters				
A.6.2.1.	Contribution to the design of an Ocean Observing National Strategy				
A.6.2.2.	Incorporation of UIB into SOCIB's Governance Bodies				
A.6.2.3.	Update of the ICTS SOCIB Statutes to enhance governance, adaptability, and strategic alignment				

2.5.2. Follow-up indicators

The following **60 follow-up indicators**, linked to each action, are presented to assess the progress and fulfillment of actions, strategies, and objectives.

Table 12. List of follow-up indicators with means of verifications.

Action	Follow-up indicators
A.1.1.1.	Creation of a user committee of the Digital Twin of a Marine Protected Area (Cabrera National Park) in the Balearic Sea.
A.1.1.2.	100% of the Digital Twin prototype of a Marine Protected Area (Cabrera National Park) developed.
A.1.1.3.	At least 10 survey responses and analysis of the digital twin.
A.1.2.1.	Creation of a user committee of the Digital Twin for Climate change adaptation planning in urban beaches (Cala Millor bay) in the Balearic Sea.
A.1.2.2.	100% of the Digital Twin prototype for Climate change adaptation planning in urban beaches (Cala Millor bay) developed.
A.1.2.3.	At least 10 survey responses and analysis of the digital twin.
A.1.3.1.	At least 5 key observing platforms adapted.
A.1.3.2.	At least 2 key forecasting models adapted.
A.1.3.3.	At least 3 AI-focused training actions.
A.2.1.1.	At least 7 gliders available.
A.2.1.2.	At least 90% of uptime percentage.
A.2.1.3.	At least 3 Argo profiling floats and 8 surface drifters active per year.
A.2.1.4.	At least 2 videomonitoring stations operational at yearly basis.
A.2.1.5.	At least 4 satellite datasets and 1 toolbox migrated to cooperative servers.
A.2.1.6.	At least 6 equipment renovated.
A.2.2.1.	At least 90% of the days per year providing 48 h WMOP forecast.
A.2.2.2.	At least 90% of the days per year providing 48 h rissaga forecast.
A.2.2.3.	At least 90% of days per year providing, at least, 24 h prediction of the Balearic Islands operative.
A.2.3.1.	At least 12 of software applications integrated into CI/CD process.
A.2.3.2.	At least 4 new major functionalities implemented.
A.2.4.1.	At least 8 Data Management Plans developed and published in SOCIB corporate website.
A.2.4.2.	At least 6 new data products incorporated with DOI.
A.2.4.3.	Maintenance of the CoreTrustSeal certification during the period.
A.3.1.1.	100% optimization features implemented in the SOCIB Metocean Data Repository.
A.3.1.2.	100% of the traceability strategy designed, with at least 2 key actions implemented.
A.3.1.3.	100% of advanced functionalities implemented and at least 2 new data types incorporated.
A.3.2.1.	At least 20% competitive access to the glider fleet.

Action	Follow-up indicators
A.3.2.2.	100% of the open access protocol designed and external access committee created to SOCIB Research Vessel.
A.3.2.3.	100% of the Access Unit created.
A.3.3.1.	At least 10 publications per year.
A.3.3.2.	At least 15 oral talks per year.
A.3.4.1.	At least 4 strategic collaborations at the regional, national, and international levels established.
A.3.4.2.	At least 3 joint scientific and technical initiatives with national ICTS.
A.4.1.1.	100% of the socioeconomic impact study report completed and published on the corporate website.
A.4.1.2.	100% of Working backwards Protocol to SOCIB's digital applications.
A.4.1.3.	At least 20 students supervised.
A.4.1.4.	100% of the Institutional Open Science Policy designed and approved.
A.4.2.1.	100% of the developments and new functionalities tendered, implemented and operational.
A.4.2.2.	At least 4 high quality resources created.
A.4.2.3.	At least 4 impact activities developed.
A.4.2.4.	At least 4 appearances in regional, national and international media ensured.
A.4.3.1.	100% of the SoS System installed and operational.
A.4.3.2.	1 MOOC on digital twins created.
A.4.4.1.	At least 2 advanced tools implemented.
A.4.4.2.	At least 50% of the measures contemplated in the Organizational Transformation Plan implemented.
A.5.1.1.	100% of the Human Resources Plan implemented.
A.5.1.2.	100% of the actions from the Gender Equality Plan implemented.
A.5.1.3.	At least 20 training actions from the Training Plan implemented.
A.5.1.4.	100% of the I Remote Work Plan implemented.
A.5.2.1.	100% of the task management system implemented to all ICTS SOCIB areas.
A.5.2.2.	100% of the intranet implemented.
A.5.2.3.	100% of the ERP software implemented.
A.5.3.1.	100% of the items in the Specific Compliance Profile (SCP) for Essential Security Requirements implemented.
A.6.1.1.	100% RedIRIS connectivity.
A.6.1.2.	100% of the common spaces, outreach areas, and laboratories equipped, labeled, and signposted.
A.6.1.3.	100% of staff working at the new ICTS SOCIB headquarters.
A.6.1.4.	100% of the planned IT services and backup system enhancements implemented and operational.
A.6.2.1.	100% of the Proposal for the design of an Ocean Observing Strategy developed.
A.6.2.2.	100% of the Proposal to the Governance Bodies of SOCIB of the incorporation of UIB designed.
A.6.2.3.	Updated statute proposal submitted to the Governance Bodies.

2.6. INVESTMENT PLAN

Introduction

This document presents SOCIB's investment plan for the 2025-2028 period. The annual and total figures for these investments are approved since they are included in the III Addenda investments for this 4 year period. Investments focus on the update of scientific equipment acquired more than 10 years ago (therefore in many cases fully depreciated) and strengthening the ocean observing, forecasting, and data management infrastructures. Investments are also allocated across strategic plan objectives, including the development of Digital Twins for marine decision-making, the expansion of observing and forecasting systems, the reinforcement of knowledge transfer and institutional impact, the enhancement of organizational efficiency, and the long-term sustainability of SOCIB's infrastructure.

Additionally, investments are categorized into three main types: 1) investments to maintain the operability and/or the capabilities of the Outstanding ICTS facility, and to avoid obsolescence; 2) investments aiming at increasing the capacities of the Outstanding ICTS facility; 3) other investments.

Investments by strategic objective

Over the 2025-2028 period, ICTS SOCIB will invest **14,683,935 €**. These investments will be allocated across five key objectives: 2,105,000 € for developing Digital Twins for marine decision-making, 4,654,735 € for expanding observing, forecasting, and data management systems, 906,000 € for reinforcing knowledge transfer and institutional impact, 260,000 € for strengthening organizational efficiency, and 6,758,200 € for ensuring long-term institutional sustainability. The funding is strategically distributed to update and modernize scientific infrastructure, improve operational capacities, and advance research-driven solutions for coastal and marine management. With a strong commitment to innovation, sustainability, open data, and open science, SOCIB will continue to play a pivotal role in advancing oceanographic research and fostering impactful solutions for marine decision-making (Table 1).

Table 1. Investment breakdown by strategic objective.

Strategic objective		Euros
01.	**Develop functional Digital Twins to support ocean and coastal decision-making in the Balearic Sea**	**2,105,000 €**
02.	**Improve observation, prediction, and data management to ensure sustainable and open data for SOCIB RI System**	**4,654,735 €**

	Strategic objective	Euros
03.	**Enhance open access to outstanding facilities, services, and scientific and technical contributions to foster ocean research and innovation**	Partially included in Objective 2.
04.	**Reinforce knowledge transfer, corporate communication, and strategic planning to enhance SOCIB's institutional impact:**	**906,000 €**
05.	**Strengthen organizational structure, promote professional development, and improve corporate management quality to enhance institutional efficiency**	**260,000 €**
06.	**Ensure the long-term sustainability of ICTS SOCIB and successfully commission the new headquarters**	**6,758,200 €**

Objective 1, *Develop functional Digital Twins to support ocean and coastal decision-making in the Balearic Sea*, has a total investment of **2,105,000 €**. Investments under this objective focus on developing Digital Twin technologies to enhance marine and environmental decision-making. Investments under this objective focus on developing Digital Twin technologies to enhance marine and environmental decision-making. This includes upgrading server infrastructure (880,000 €) to support the development of the Digital Twin of a Marine Protected Area (Cabrera National Park) and the Digital Twin for Climate Change Adaptation (Cala Millor Urban Beach, also covering annual outsourcing for their user interfaces development and maintenance over two years (100,000 € each, with a total of 200,000 €). Additionally, SOCIB is adapting its observing system for Digital Twins, expanding observation capabilities through new moorings, floats, and unmanned surface vehicles (995,000 €). Finally, an investment in enhancing AI capabilities for ocean observation through high-performance GPUs and AI-driven analysis tools will improve forecasting (30,000 €).

Objective 2, *Improve observation, prediction, and data management to ensure sustainable and open data for SOCIB RI System*, has a total investment of **4,654,735 €**. Investments aim to enhance SOCIB's observing platforms, data collection, and real-time monitoring capacity. Key investments include the renewal of the glider fleet and equipment, with the acquisition of new gliders and sensors (997,000 €). The enhancement and maintenance of HF radar ensure the reliability and accuracy of high-frequency radar systems (325,250 €). The continuous data collection with Lagrangian platforms expands the network of surface drifters and profiling floats (539,000 €). Additionally, SOCIB is upgrading and maintaining beach monitoring platforms, with investments in monitoring equipment and bathymetric surveys (185,000.00 €). The modernization of SOCIB's equipment pool includes upgrades to operational and monitoring equipment (1,288,485 €) and the modernization of SOCIB Research Vessel (1,320,000 €).

Objective 3, *Enhance open access to outstanding facilities, services, and scientific and technical contributions to foster ocean research and innovation*, does not have a specific investment allocation for the 2025-2028 period. The investments associated with Objective 3 are considered in Objective 2, since they are related to the improvement of the observing systems that allows the open access and the impact on research and innovation (O2).

Objective 4, *Reinforce knowledge transfer, corporate communication, and strategic planning to enhance SOCIB's institutional impact*, has a total investment of **906,000 €**. Investments under this objective focus on improving science communication, knowledge transfer, and institutional outreach. A study will assess SOCIB's socioeconomic impact, while the design and implementation of an open science policy will reinforce its commitment to open-access research (45,000 €). An investment of 301,000 € will optimize the corporate website, improving user experience and accessibility. The Science on a Sphere outreach space, an interactive marine science communication tool, represents a 220,000

€ investment. SOCIB will also allocate 130,000.00 € to support knowledge transfer and outreach events at national and international scientific forums. Additionally, SOCIB will invest to develop media and science communication strategies to boost visibility and outreach, to implement innovative tools and methodologies to improve its strategic planning, and to promote an organizational transformation plan (150,000 €). Lastly, 60,000 € will be dedicated to communication and training for Digital Twins, supporting the development of educational materials and online courses.

Objective 5, *Strengthen organizational structure, promote professional development, and improve corporate management quality to enhance institutional efficiency*, has a total investment of **260,000 €**. This objective focuses on modernizing internal management systems to optimize SOCIB's operations. The key investment under this objective is the implementation of an Enterprise Resource Planning (ERP) system, which will enhance administrative, financial, and project management efficiency by integrating and automating key management processes (260,000 €).

Objective 6, *Ensure the long-term sustainability of ICTS SOCIB and successfully commission the New Headquarters*, has a total investment of **6,758,200 €**. Key investments include the installation of the Global Research Network RedIRIS at SOCIB's headquarters to establish high-speed connectivity (1,500,000 €), the provision of furniture and scientific equipment to ensure the new headquarters is fully equipped for research and operational activities (furniture: 1,850,000 € and scientific equipment: 2,255,000 €), and the implementation and expansion of IT services to strengthen data storage, cloud computing, and IT infrastructure (1,153,200 €). These investments will support efficient research, data management, and institutional operations at SOCIB's new headquarters.

Investments by type

The investment plan for SOCIB over the 2025-2028 period is structured into three main types: maintaining and upgrading the SOCIB outstanding facility (type 1), expanding capacities (type 2), and strategic institutional improvements (type 3), with a total investment of **14,683,935 €**. Specifically, 9,662,935 € is allocated to Type 1 investments, ensuring the operability and modernization of SOCIB's outstanding facility. 2,005,000 € is directed towards Type 2 investments, focused on expanding the capacities of SOCIB's infrastructure, particularly through the development of Digital Twins for marine and environmental decision-making. Lastly, 3,016,000 € is dedicated to Type 3 investments, aimed at enhancing institutional impact, knowledge transfer, and operational efficiency (Table 2).

Table 2. Investment breakdown by type.

Type		Euros
Type 1	Investments to maintain the operability and / or the capabilities of the Outstanding ICTS facilities, and to avoid obsolescence	9,662,935 €
Type 2	Investments aiming at increasing the capacities of the Outstanding ICTS facilities	2,005,000 €
Type 3	Other investments	3,016,000 €
TOTAL		14,683,935 €

SOCIB will allocate **9,662,935 € under Type 1 investments**, which focus on updating the scientific equipment acquired more than 10 years ago (therefore in many cases fully depreciated), maintaining the operability and capabilities of SOCIB's outstanding facility, SOCIB RI System, while pre-

venting obsolescence. These funds will ensure the continuity and modernization of operational infrastructure, observing and forecasting systems, and research equipment. Key projects include the development of the Digital Twin prototype for Climate Change Adaptation at Cala Millor urban beach, enhancing SOCIB's digital capabilities and infrastructure (100,000 €). Additional major investments include the renewal of the glider fleet and equipment (997,000 €), supporting continuous oceanographic observations, and the enhancement, optimization, and continuous monitoring of the HF Radar system to improve surface current monitoring (325,250 €). The continuous data collection with Lagrangian platforms will strengthen SOCIB's network of drifters and profiling floats (539,000 €), while the upgrade and maintenance of beach monitoring platforms will improve coastal observation capabilities (185,000 €). Moreover, the modernization of SOCIB's equipment pool for operations, including upgrades to diving equipment, vehicles, and monitoring systems, represents a significant portion of this investment (1,288,485 €), alongside the modernization of SOCIB's research vessel (RV SOCIB) and biogeochemical research capabilities (1,320,000 €). Infrastructure investments also include the installation of the Global Research Network RedIRIS at the new headquarters, ensuring high-speed connectivity for research collaboration (1,500,000 €), the provision of scientific equipment and installations (including some unexpected cost items that are already appearing in the final phase of the construction) for the new headquarters (2,255,000 €), and the expansion of IT services, strengthening SOCIB's digital infrastructure (1,153,200 €).

Under **Type 2 investments**, totaling **2,005,000 €**, SOCIB will focus on increasing the capacities of SOCIB's outstanding facility. These investments are dedicated to advancing Digital Twin technologies for marine and environmental decision-making. Key projects include the development of the Digital Twin of a Marine Protected Area in Cabrera National Park, which enhances SOCIB's digital infrastructure through server upgrades and user-interface development (980,000 €). Additionally, SOCIB is adapting its observing system to support the Digital Twins of the Ocean, expanding ocean monitoring through new moorings, subsurface floats, and bathymetric surveys (995,000 €). Investments in AI capabilities for ocean observation will enhance data processing, forecasting, and user interaction through high-performance GPUs and an AI-powered chatbot (30,000 €).

Under **Type 3 investments**, totaling **3,016,000 €**, SOCIB aims to reinforce institutional impact, knowledge transfer, and operational activities and efficiency. The largest cost item of Type 3 investments will be allocated to furnish SOCIB's new headquarters, ensuring a fully functional research and operational environment (1,850,000 €). Other efforts include research accessibility and transparency through a socioeconomic impact study and Open Science Policy (45,000 €), the optimization of the corporate website for improved accessibility and user experience (301,000 €), and outreach efforts such as scientific engagement activities, public knowledge transfer events, and media outreach strategies (190,000 €). Additionally, an interactive communication tool for marine sciences, the Science on a Sphere outreach space, will be installed (220,000 €), while communication and training plans for Digital Twins, including the development of educational materials, will be supported (60,000 €). Governance and institutional development will be strengthened through investments in strategic planning tools and organizational transformation initiatives, focusing on leadership and gender equality principles (90,000 €). To enhance administrative and financial management, SOCIB will also implement an Enterprise Resource Planning (ERP) system (260,000 €).

Investments by priority

All investments in this plan, **14,683,935 €** are **high priority**, directly addressing critical needs identified for carrying out the actions outlined in the strategic plan, such as upgrading aging infrastructure, enhancing research capabilities, and ensuring SOCIB's continued operation and competitiveness. SOCIB, through the III Addenda investments for this 4 year period, has secured the necessary funding to support these high-priority investments, ensuring their feasibility and timely implementation.

2.7. SCIENTIFIC AND TECHNICAL ADVISORY COMMITTEE ASSESSMENT REPORT

This section presents the report of the Scientific and Technical Advisory Committee (STAC), which met on December 2–3, 2024, including its main conclusions, guidelines, and recommendations. The composition of the Committee was renewed during 2024, pending approval by the SOCIB Board of Trustees.

Date: 3 and 4-12-2024 **Location**: Online

3th meeting of the SOCIB International Scientific Steering Committee (ISSC)[1]

Assessment Report

Authors

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Dr. Joanna Staneva (Institute for Coastal Research, Helmholtz Centre Geesthacht - HEREON, DE)
Mr. Mathieu Belbeoch (World Meteorological Organization/OceanOPS, FR)
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Prof. Alberto Arribas (National Oceanography Centre, UK)
Dr. Javier Varona Gómez (University of the Balearic Islands, SP)
Dr. Marina Tonani (Mercator Ocean International, FR)
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ISSC Chair

[1] ISSC is also known as Scientific and Technical Advisory Committee (STAC)

Table of content

Detailed Analysis of Outcomes from Strategic Plan (SP) 2021-2024 and Recommendations for SP 2025-2028

INTRODUCTION

The third meeting of the Balearic Islands Coastal Observing and Forecasting System (SOCIB) International Scientific Steering Committee (ISSC) was held via videoconference on December 3rd and 4th, 2024. This report to the Board of Trustees presents the key findings and recommendations of the ISSC, based on a thorough analysis conducted following presentations, on main objectives and highlights of Strategic Plan 2021-2024 and initial ideas for Strategic Plan 2025-2028, as delivered by the SOCIB Director and SOCIB Team leaders responsible for the various sections of the organizational structure, as well as the subsequent discussions with the SOCIB Team and amongst members of the ISSC.

The report is organized in alignment with the structure of the presentations received from SOCIB, with the addition of three cross cutting sections—European Union Funds, Engaging SOCIB Users, and Digital Twins of the ocean—which the committee deemed appropriate to include.

For each section, the committee offers a detailed diagnosis and a set of recommendations intended to support the SOCIB leadership in their strategic decision-making processes.

SOCIB CURRENT ACHIEVEMENTS

The ISSC recognizes that SOCIB has firmly established itself as a leading research infrastructure in the Western Mediterranean, and its work is respected in Europe and globally. It has successfully navigated the complexities of sustaining operational ocean observing and forecasting systems, achieving outstanding accomplishments across operational, scientific, structural, and service delivery dimensions, all of which provide significant benefits to regional users. Additionally, SOCIB plays a pivotal role in global observing and forecasting initiatives, earning widespread recognition as an international leader in its field.

Building on this strong foundation, SOCIB is exceptionally well-positioned for further development, particularly in enhancing the integration of science with the needs of end-users. Notably, SOCIB has achieved this remarkable leadership despite operating without the advantages afforded to larger national hubs such as Barcelona or Madrid, demonstrating exceptional resilience and capability. The presence of University of the Balearic Islands (UiB) and

Mediterranean Institute for Advanced Studies IMEDEA (CSIC-UIB) and IEO-CSIC has offered valuable support and collaboration opportunities, further contributing to SOCIB's success.

The following key findings highlight SOCIB's extraordinary achievements and underscore its potential for continued leadership in the field of coastal ocean observing and forecasting;

1. **Leadership and vision**

SOCIB's success is a consequence of outstanding leadership and a well aligned highly competent team. The clear and strategic vision of the Director and the deep facility focused expertise and commitment of the SOCIB Team have positioned SOCIB as an international reference in marine observation and forecasting. Efforts to align with international frameworks, including Global Ocean Observing System (GOOS), Copernicus Marine Services (CMEMS), European marine data service EMODnet and the European Commission's Horizon Europe, reflect strong strategic positioning. By leading innovative projects, SOCIB demonstrates its capacity to bridge scientific research and operational services, advancing cooperation throughout Europe..

2. **Efficiency**

SOCIB has shown remarkable efficiency in utilizing its allocated resources, achieving results that typically require substantially larger funding and/or longer timescales. This has been achieved through the vision, leadership, and international experience of the Director, combined with sound management practice and commitment from the SOCIB Team. This is being continued through the implementation of AGILE management strategies, initiating now and aligning SOCIB with the practices of top-performing organizations worldwide, and in line with the transformation in research organisations at international level requested under the UN Ocean Decade.

3. **Strategic achievements**

SOCIB has delivered on its core mission of providing access to research infrastructures and advancing scientific understanding and knowledge transfer to society, excelling across its integrated activity areas. Among the remarkable strategic achievements are:

- It is today an operational multi-platform infrastructure integrating facilities across the ocean observing value chain -from ocean observing through data management and ocean prediction, to services for science and society - that is regionally and internationally recognised for excellence in ocean data, science, open access, regional and local prediction and assimilation, with clear societal outputs. As a consequence SOCIB has potential to provide leadership in integrated ocean information products and services to national and regional users.

- Achievement of a new formal agreement with regional and national government sponsors for 2024-2033 (3rd addendum), focusing on major international challenges and aiming to deliver the Digital Twins of the Ocean, for which SOCIB is particularly well positioned with its focus on observing, forecasting, and harnessing technology for societal impact.
- Observing and forecasting systems contributing to digital twin prototypes addressing climate change, sea-level rise, and coastal resilience and well aligned with the European Digital Twin Ocean (DTO) initiative
- Maintaining a focus on scientific excellence that also serves society, considering policy priorities at national, European and global scales, as we face challenges related to ocean use and climate.
- Alignment with Spanish, EU and other and international (USA/ONR) research systems, leading to stronger institutional integration and new funding opportunities. This alignment underscores SOCIB's strategic adaptability and its relevance in the international research ecosystem.
- Cutting-edge data tools and forecasting models and data assimilation integrated into national and international systems such as the Copernicus Marine Service, advancing predictive capabilities for stakeholders in marine safety, climate adaptation, and coastal planning in support of public policies.
- Enhanced collaboration with stakeholders in marine safety, climate adaptation, and coastal planning.
- Recognition as a CoreTrustSeal Data Center highlighting its commitment to data integrity, accessibility, and sustainability. SOCIB and its contributions to global initiatives like Copernicus Marine Service, European marine data service EMODnet and digital twin ocean frameworks, further emphasize its global impact and strategic alignment.
- SOCIB's success in securing European funding strengthens innovation at national and European levels, fosters vital collaboration across local, European, and global scales, and enables partnerships with leading marine science and technology organizations. This exchange of expertise enhances both SOCIB's operations and the broader scientific community.
- Construction of a new building. The new Unique Scientific and Technical Infrastructure (ICTS) SOCIB headquarters will contribute to well-being in the workplace, reinforce SOCIB organisational efficiency and visibility, and enhance stakeholder and citizen engagement.SOCIB is a multi-platform, integrated (observing-data management-prediction-services = value chain) operational infrastructure, that is regionally and internationally recognised for excellence in ocean data, science, open access data, regional and local prediction and assimilation, with some clear societal

outputs. As a consequence, SOCIB has potential to provide leadership in integrated ocean value chain services and to provide sound support to public policies..

Maintaining a focus on scientific excellence that also serves society as the nations facing challenges related to ocean use and climate. Developing a future focused strategy to leverage new technological developments to transform ocean services for Spain and strengthen Spanish leadership in operational oceanography in the Mediterranean region.

CROSS CUTTING SECTIONS

The next sections contain the ISSC reflections on three cross cutting areas for SOCIB growth and development, sustainability and stability, and recommendations for potential actions.

1. European Union funding

The board acknowledges the critical importance of EU funding for SOCIB, as a good measure of its international scientific competitiveness. EU funding represents a cornerstone of the European scientific investment landscape, enabling substantial contributions that stimulate knowledge exchange and foster collective efforts across borders. Beyond its inherent value, the acquisition of EU funding reflects SOCIB's ability to leverage the financial support received from its national sponsors. This leveraging mechanism not only maximizes the impact of national investments but also brings tangible benefits back to the Spanish community by enhancing and upgrading SOCIB's infrastructure, thereby creating a virtuous cycle of improvement and innovation.

Moreover, securing EU funding underscores SOCIB's international success and its recognition as a leader in marine science and technology within a highly competitive funding environment. SOCIB's consistent ability to secure such funding reflects excellence, positioning, and reputation in the global scientific community.

Furthermore, cooperation at the EU is not merely an option but a necessity for addressing complex challenges in marine research and operational systems. EU cooperation exemplifies this imperative, representing a success in its own right—a model of value-driven strategy that aligns perfectly with the inherently collaborative nature of ocean science.

Recommendations:

I. **Maintain a suitable level of engagement in European funding initiatives**, as this is important to supporting SOCIB collaboration in Europe and thereby fostering innovation. and efficiency. SOCIB should track the level of European funding to other sources to maintain balance in achieving its mission.

2. Transfer of knowledge and engaging SOCIB users

SOCIB has established robust relationships with a diverse array of users, spanning local, regional, national, European, and global levels. Its ability to support stakeholders across key sectors—such as public and private entities, fisheries, emergency response teams, environmental science communities, and national park technicians—highlights the adaptability and utility of its observing and forecasting systems.

SOCIB's adherence to internationally recognized frameworks, such as the Global Ocean Observing System (GOOS) Essential Ocean Variables (EOVs), and its commitment to providing quality-controlled metadata in standardized formats, ensures its contributions are seamlessly integrated into regional and global data systems. SOCIB's engagement in 63 agreements with public and private entities demonstrates its proactive approach to facilitating the practical application of its tools and data. This work is more valuable than is apparent, there are some areas for improvement that would help strengthen SOCIBs connection to specific user sectors and the understanding of the value of its services.

The Committee notes the following areas that can help SOCIB to further enhance its impact and relevance in the scientific and policy domains.

Recommendations:

I. **User mapping and gap analysis.** Develop a comprehensive map of current users across local, regional, and global levels, categorizing them by sector and purpose of engagement. Identify underrepresented sectors or regions where ocean data could have impact, and add focus on strengthening relationships in these areas.

II. **Highlighting policy contributions.** Emphasize SOCIB's critical role in supporting European and global policy frameworks through initiatives such as GOOS EOVs, quality-controlled metadata, and data flow integration, through reporting and communications. Showcase these pathways, amongst other user pathways, to demonstrate the broad impact of SOCIB's data on addressing climate, biodiversity, and pollution issues.

III. **Focus on strategic sectors.** Strengthen engagement with key sectors where SOCIB's data and services are particularly valuable, such as fisheries, emergency response, and environmental management. Tailor tools and applications to address the specific needs and priorities of these groups.. Select one or two strategic areas and implement pilot programs to maximize user involvement and demonstrate tangible benefits.

IV. **Socioeconomic valuation of services.** Support socioeconomic studies to evaluate the economic and societal value of the SOCIB observing and forecasting system. Collaborate with economic consultancy services, similar to studies undertaken by the Integrated

Marine Observing System (IMOS), Australia, and international satellite communities, to quantify the benefits and further justify funding and stakeholder investment.

V. **Stakeholder-centric applications:** Collaborate with end-users to co-design forecasting tools that address specific needs, such as fisheries management, renewable energy planning, and coastal tourism. Focus on translating high-resolution forecasts into actionable information tailored for diverse stakeholder groups, ensuring usability and impact.

SOCIB'S EMBRACE OF THE DIGITAL TWIN OF THE OCEAN (DTO)

SOCIB's strategic decision to prioritize the development of the Digital Twin of the Ocean (DTO) within its future plan marks an essential and forward-looking milestone. DTO and DTO prototypes could serve as a focused objective to align the goals of different facilities and create synergies between operational and research groups. This initiative reflects a deep understanding of global trends in ocean science and technology, leveraging digital innovation to address complex marine and coastal challenges.

The DTO provides a unifying framework to harmonize the goals of SOCIB's diverse facilities and foster synergies between operational and research domains. By adopting the DTO approach, and advancing on DTO prototypes, SOCIB positions itself at the cutting edge of marine science and information delivery, enabling the integration of real-time data, advanced simulations, and predictive modeling into a cohesive system. This approach enhances its capacity to inform decision-making, drive innovation, and deliver tangible benefits to regional and global stakeholders.

Recommendations:

Building on this approach, the Committee offers the following recommendations to support the successful development and implementation of the Digital Twin of the Ocean in SOCIB:

I. **Foster alignment and synergies:** Use the DTO as a focal point to align the goals of SOCIB's operational and research groups, creating synergies that enhance efficiency and output across the organization.

II. **Support emerging talent:** Engage data scientists and consider funding PhD students specializing in data science to strengthen the organization's technical expertise and innovation pipeline.

III. **Enhance AI capabilities**: Introduce Artificial Intelligence (AI) at two levels:

   A. Research level: Implement advanced AI models like machine learning and deep learning to improve data quality control, analysis, classification, modeling, and

prediction, while enabling new capabilities such as computer vision for environmental monitoring.

B. Develop AI-powered tools within the DTO to support more informed, accurate, and sustainable decision-making related to ocean protection and restoration, including nature-based solutions, habitat restoration, and adaptive management strategies

IV. **Invest in AI training:** Plan AI-focused formative actions to provide SOCIB team members with foundational knowledge, equipping them to effectively integrate AI into research and operations.

V. **Strengthen collaborations:** Build partnerships with AI research institutes and innovation laboratories to create synergies between SOCIB's goals and cutting-edge AI advancements.

VI. **Ensure cross-walk with Data Management:**

A. Incorporate AI to enhance data management and quality control processes, ensuring high-quality, reliable datasets for DTO applications.

B. Expand real-time data integration from autonomous systems, satellites, and sensor networks to improve the responsiveness and operational capacity of the DTO.

C. Leverage AI to identify complex patterns in observational data, optimizing simulation and forecasting capabilities critical to the DTO.

VII. **Advance integrated land-to-sea modeling** within the DTO to better understand and manage cross-system processes, such as sediment dynamics and coastal flooding.

STRATEGIC AREAS

The next sections contain the ISSC reflections on existing strategic function areas for SOCIB growth and development, sustainability and stability, and recommendations for potential actions.

1. Observing system

SOCIB has achieved remarkable success as a research-driven system, establishing itself as a leader in coastal ocean observing and forecasting. Through its cutting-edge observation platforms—including Gliders, Lagrangian platforms, HF Radars, Beach Monitoring, and Satellite data systems—SOCIB provides comprehensive and integrated monitoring capabilities. These systems enable extensive and precise data collection and analysis across multiple variables and dimensions, supporting both scientific innovation and operational efficiency.

SOCIB's infrastructure allows it to contribute to the entire value chain, from data acquisition to policy-relevant applications, through a FAIR (Findable, Accessible, Interoperable, Reusable) data management approach. This capacity positions SOCIB as an essential player in addressing emerging policy needs at the national and European levels. Its alignment with frameworks such as the EU Marine Strategy Framework Directive (MSFD), the Habitats Directive, and the EU Green Deal highlights the institution's strategic foresight and commitment to delivering actionable insights. The integration of these observation systems into policy frameworks not only advances marine science but also facilitates evidence-based governance and sustainable management of marine resources.

Recommendations:

The Committee offers the following recommendations to support the successful development and of the observational component of SOCIB:

I. **Expand policy-relevant observations**: Assess and evolve ocean observation systems to address gaps and emerging needs in policy-driven contexts, aligning with frameworks like the MSFD, EU Green Deal, and the upcoming EU Nature Restoration Law.

II. **Deep-ocean exploration aligned with SOCIB's coastal mandate:** While SOCIB's core mandate and *raison d'être* remains coastal ocean observing and forecasting, the unique proximity of deep-ocean conditions near the Balearic Islands provides an opportunity to expand observations into deep-sea ecosystems. Developing capabilities to monitor benthic and mesopelagic habitats, carbon flux, sequestration processes, and geohazards would address critical data gaps in deep-ocean science. These efforts can complement SOCIB's coastal focus by enhancing understanding of processes that influence both coastal and open-ocean dynamics.

III. **Enhance model calibration:** Strengthen the calibration and validation of ocean circulation models, particularly for deep-sea processes, to improve predictive accuracy and support a more holistic understanding of ocean systems.

2. Data management

SOCIB has achieved remarkable progress in data collection, management, and dissemination, establishing itself as an example in open science and open data. Its alignment with European and international standards, such as EMODnet, SeaDataNet, INSPIRE, ISO, and OGC, ensures that SOCIB's marine data is Findable, Accessible, Interoperable, and Reusable (FAIR). This adherence not only strengthens its role in national and international data ecosystems but also demonstrates SOCIB's commitment to providing high-quality, standardized data for diverse stakeholders.

SOCIB's data centre plays an important role in connecting local, regional, national, and global users with critical ocean data through key frameworks like Copernicus Marine Service, EMODnet, and

GOOS. The organization has also the potential in delivering both delayed-mode and near real-time data to initiatives like the European Digital Twin Ocean and the UN Ocean Decade's Ocean Data 2030 Strategy[2]

Additionally, SOCIB has excelled in fostering open data policies and maintaining compliance with open access standards, particularly for ship and glider facilities. These efforts underline its status as a national and European asset, contributing to the broader scientific community and beyond. However, as SOCIB's operations grow in scale and complexity, the need for advanced data strategies, infrastructure, and human resources becomes increasingly apparent. This presents an opportunity for SOCIB to reinforce its data centre as a hub for marine knowledge, continuing to position itself as a global leader in end-to-end ocean observation, data services, and user applications.

Recommendations:

To further enhance its capabilities and address emerging challenges, the Committee make the following recommendations:

I. **Appropriately resourcing the Data Centre:** to meet the demands of an increasingly data-driven society and demand for digital ocean information services SOCIB will need to carefully consider its data centre resource needs. This includes recruiting additional human resources with diverse skill sets, such as data scientists and IT specialists, to support activities related to the Digital Twin Ocean (DTO) and FAIR digital data services. Restructuring the data centre and infrastructures around specific pillars of activity, could enhance overall operational efficiency.
II. **Advocacy for dedicated funding:** SOCIB's supporting organizations should recognize the critical importance of data management and dissemination as integral components of the value chain. Advocacy for dedicated funding to support these activities at local, regional, and global levels is essential for maintaining and enhancing SOCIB's leadership in marine data services.
III. **Development of a comprehensive data management strategy.** A robust data management and publication strategy is essential to facilitate SOCIB's DTO applications and maximize its scientific and societal impact. This strategy should address data ingestion into major blue data infrastructures, the publication of value-added data products, and the use of derived statistics (KPIs) to demonstrate the infrastructure's relevance.
IV. **Development of a comprehensive software management strategy**. Software management and release is also critical to facilitate DTO applications and the maintenance of the digital infrastructure operation.

[2] https://unesdoc.unesco.org/ark:/48223/pf0000385542

V. **Streamlining and diversifying data flow.** Efforts should be made to streamline and diversify data flow across variables, ensuring that SOCIB remains a recognized hub for delivering multi-parametric data services into local, national, regional, European, and global ocean initiatives, including EMODnet and the European Digital Twin Ocean.

VI. **Standardizing metadata for provenance and licensing.** SOCIB might promote the adoption of essential metadata standards for provenance and licensing within European and global data frameworks. This would facilitate the tracking of data contributions and ensure SOCIB's data is effectively utilized downstream.

VII. **Strengthening open access policies:** SOCIB should refine its approach to open access for data and model outputs to align with national and international policies, ensuring compliance with open access mandates.

VIII. **Tracking data usage and value chain.** To better understand the impact of its data, SOCIB might consider implementing a voluntary survey mechanism to track data usage and user demographics. This would help capture the entire value chain and highlight SOCIB's contributions to European and global data systems.

3. Prediction system

SOCIB has demonstrated exceptional achievements in forecasting systems through its work in tools like WMOP, BSOP, BRIFS, and SAPO. These systems, built on robust physics-based models, deliver reliable, high-resolution forecasts that support marine resource management and coastal resilience.

However, maintaining and advancing multiple forecasting systems is resource-intensive, presenting challenges to strategically optimize efforts and align them with evolving stakeholder needs and emerging technologies.

To support these sustainability needs over time, along with other recommendations, the committee notes the suggestions below.

Recommendations:

I. **System consolidation:**

- Review and streamline existing forecasting systems to optimize resource allocation and enhance operational efficiency.
- Develop a roadmap for consolidating overlapping functionalities across forecasting systems, prioritizing modularity and scalability to ensure flexibility in future upgrades.

II. **Data assimilation expansion:** Strengthen data assimilation techniques to enhance prediction accuracy, particularly in complex coastal and dynamic ocean regions. Integrate real-time data streams from autonomous observing platforms (e.g., gliders, drifters) to improve the assimilation of nearshore processes into forecasting models.

III. **Interdisciplinary modeling:** Develop interdisciplinary approaches by integrating physical, biogeochemical, and ecological models to address comprehensive challenges like climate adaptation, ecosystem management, and carbon cycling.

IV. **Interactive Digital Twin frameworks**: Align forecasting systems with DTO frameworks to enable real-time scenario testing and what if scenario for supporting decision-making in diverse applications, including coastal resilience and marine spatial planning. Leverage DTO capabilities to deliver interactive, stakeholder-focused tools for emergency response and proactive coastal risk management.

V. **High-Resolution multi-Scale modeling:** Expand efforts to create and validate high-resolution coupled models for coastal and open-ocean processes, emphasizing critical areas such as sediment transport, biogeochemical fluxes, and extreme event dynamics.

4. Management Strategy, Communication and Human Resources

SOCIB's governance and management structure have been instrumental in its evolution into a leading research infrastructure, demonstrating excellence across multiple dimensions embracing the following components:

1. **Effective leadership and strategic vision:** SOCIB's director and management team have provided exceptional leadership, transforming a clear strategic vision into actionable outcomes. Their ability to align scientific excellence with societal relevance has been critical in positioning SOCIB as a reference for research infrastructures.
2. **Integration into national and international systems**: SOCIB has significantly strengthened its alignment with the Spanish research and innovation system through its integration into the ICTS map (2014) and the increased participation of CSIC since 2021. It has been an active actor in European programs and projects, enhancing institutional positioning and unlocking new avenues for funding and partnerships.
3. **AGILE and transparent decision-making**: SOCIB has started to implement AGILE management practices that foster efficiency, adaptability, and accountability. These practices have enabled it to be exceptionally efficient in the use of available resources, positioning SOCIB as a potential model for other research infrastructures.
4. **Collaborative governance structure:** SOCIB's governance model promotes collaboration among diverse stakeholders, including academia, public and private sector, government agencies, and international organizations. This collaborative approach strengthens the institution's ability to meet evolving challenges and strategic objectives, including public private partnerships, PPP.

5. **Forward-looking:** SOCIB's governance is evolving to support emerging priorities, such as the development and implementation of Digital Twin Ocean (DTO) prototypes, which require a multi-disciplinary and collaborative working team
6. **Workforce capacity and adaptability:** SOCIB has shown resilience in managing human resource constraints despite external limitations, demonstrating adaptability in sustaining operations across key areas, including IT infrastructure, data management, and modeling systems.

Recommendations:

The following recommendations are designed to enhance SOCIB's governance framework, ensuring its ability to address challenges effectively and support its strategic objectives. While the Committee recognizes that some of the proposed components may extend beyond SOCIB's immediate decision-making framework, we still strongly advocate for their consideration by the Board of Trustees, due to their critical importance in sustaining and amplifying SOCIB's success.

I. **Maintain leadership and strengthen SOCIB team/workforce capacity**: SOCIB must ensure adequate human resources to ensure its leadership, sustain its growing operations, and to implement the Digital Twins of the ocean. Key actions include:

- Flexible employment structures (e.g., adaptable contracts and competitive in salary and career tenure tracks) to attract and retain top talent.
- Continuous professional development and upskilling opportunities to enhance staff well being and capabilities.
- Balancing permanent and temporary positions to support DTO architecture, including IT infrastructure, data management, and modeling systems.
- Establishing comprehensive career plans with clear development metrics and using employee satisfaction as a KPI to ensure a motivated workforce.

II. **Planning actions to strengthen SOCIB's internal structure:**

- Promote talent retention and attraction through well-defined career plans.
- Balance the allocation of staff between operations, research and development and the maintenance of DTO architecture.

III. **Broader societal engagement:**

- Expand communication strategies targeting policymakers and underrepresented user groups to increase the uptake and relevance of SOCIB's data and tools.

- Develop innovative, multidisciplinary data products tailored to policy needs (e.g., MSP-oriented products, coastal erosion studies, habitat suitability analyses, and climate adaptation).
- Foster frameworks for knowledge exchange and co-design with stakeholders to maximize outcomes.

IV. Long-term planning for organizational sustainability:

- Address risks associated with both observational (e.g., fixed moorings) and digital (e.g., databases and tools) infrastructure to ensure operational continuity.
- Adapt governance structures to meet evolving demands, internally reinforcing the AGILE transformation already initiated and also considering both the SOCIB's potential integration as an additional center within CSIC and the potential incorporation of UIB to the SOCIB governing bodies.
- Leverage generative AI tools, including Large Language Models (LLMs), to optimize administrative tasks such as report generation, proposal drafting, and public engagement.

2.8. NEW OUTSTANDING FACILITIES PROPOSAL

A. Introduction

The gliders of ICTS SOCIB are autonomous vehicles about 2 meters long and weighing 60 kilograms. The gliders are equipped with a set of sensors capable of continuously measuring Essential Ocean Variables: temperature, conductivity, fluorescence, chlorophyll, oxygen, and turbidity, among others, from the surface to depths of up to 1,000 meters. These data help understand physical and biogeochemical processes at different spatial and temporal scales.

During the 2021-2024 period, the SOCIB Glider Fleet was recognized as an **important facility**, while the SOCIB Metocean Data Repository remained the sole Outstanding Facility. Despite its reclassification, the Glider Fleet maintained a **high level of research activity through competitive access calls**. Moreover, ICTS SOCIB has consistently reported all gliders' operational days in the ICTS DATA application, where it has been recorded as an Outstanding Facility. This ongoing reporting has ensured the continuous evaluation of the Glider Facility by the Spanish Ministry of Science, Innovation, and Universities (MICIU).

Looking ahead to the 2025–2028 period, the primary objective is **to reinstate the Glider Fleet as an Outstanding Facility**. This initiative highlights SOCIB's commitment to providing valuable research opportunities to the scientific and technological community. Regaining this status would further solidify ICTS SOCIB's position as a leader in ocean observation, research, and sustainable marine resource management. This annex outlines the major advancements achieved during 2021-2024, demonstrating SOCIB's readiness to provide the Glider Fleet in competitive access for the 2025-2028 period.

B. Glider fleet general operations 2021-2024

During the 2021–2024 period, SOCIB's Glider Fleet has demonstrated exceptional operational capacity, completing **64 missions** over **2,422 days at sea**, covering a total of 28,876 nautical miles. These efforts have resulted in the collection of **79,575 CTD profiles**, providing critical oceanographic data. The fleet has maintained an average of 37.8 days in the water per mission. These numbers highlight SOCIB's sustained commitment to maintaining and optimizing its glider operations, ensuring their availability for the scientific community. It is important to note that the SOCIB Glider Fleet has an activity which is among the most efficient internationally, in terms of number of days of operation at sea, number of total platforms available and sensors employed, and allocated personnel (2 permanent +1 under contract senior technicians).

In addition, between 2021 and 2024, SOCIB **significantly expanded** its coverage to the CANALES endurance line, increasing **from 953 days** (2017-2020) to **1,320 days** in 2021-2024. Additionally, 11 new missions were conducted in previously **unexplored observational areas** (FRONTIERS, FRIPP, NOC, FastSwot, DOORS, EBAMAR, CESMEC & CESCAB) contributing **316 glider days**, 4,000 nm covered, and 7,974 CTD profiles. These figures highlight SOCIB's continuous efforts to expand its observational capabilities, reinforcing its contribution to oceanographic research and environmental monitoring.

The gliders' activities are aligned with the European and international frameworks through scientific collaborations, including European initiatives like JERICO RI and the Copernicus Marine Service, and internationally with the CALYPSO project, funded by the U.S. Office of Naval Research.

C. Technological advancements and infrastructure improvements 2021-2024

ICTS SOCIB has invested in upgrading and maintaining its Glider Fleet, ensuring optimal performance and adaptability to new scientific and operational challenges.

In 2021, ICTS SOCIB enhanced its Glider Fleet by acquiring **two new gliders** and **four science bays,** ensuring continued operational capacity, the reliability of the recorded data and technological advancement. During this period, **two outdated gliders were retired**, and one glider was lost in the Ibiza Channel. Additionally, the fleet was upgraded with the **integration of biogeochemical sensors**, enabling the measurement of key ocean variables such as dissolved oxygen and chlorophyll, further improving ocean health monitoring and research capabilities. In addition, the fleet was upgraded with the **integration of acoustic sensors** (much required by scientists), enabling the measurement of acoustic signals, including marine life vocalizations, ambient noise, and anthropogenic sounds. These enhancements have improved data quality and mission efficiency, positioning SOCIB as a leader in autonomous ocean observations and responding to scientists requests.

SOCIB has also actively contributed to the BlueCloud2026 project, advancing the standardization of glider data formats. The transition to OG1.0 format is underway, with metadata and added-value products being defined in collaboration with the international research community.

D. Competitive Open Access to SOCIB Glider Fleet in 2021-2024

In order to **reinstate the Glider Facility as an Outstanding Facility**, the ICTS SOCIB made a substantial effort during 2021-2024 to improve the Competitive Open Access to its Glider Fleet. Internal responsibilities have been reorganized, and a Competitive Open Access Protocol has been strengthened, describing the mechanisms and criteria to access this facility. A dedicated Open Access Glider Section has been created on the SOCIB corporate website, providing clear guidelines for researchers on how to apply for access.

To submit a request under this type of access, a Competitive Open Access Call must be available. Proposals submitted under the Competitive Open Access calls undergo a technical feasibility evaluation from SOCIB's technical team. Subsequently, the External Access Committee assesses and prioritizes them based on criteria of scientific and technical excellence. As a result of these efforts,

the ICTS SOCIB achieved significant results in **2024, with 24% of its glider capacity allocated to Competitive Open Access projects**, demonstrating the scientific and technological community's interest in utilizing SOCIB's glider fleet.

In the 2021-2024 period, **Competitive Open Access calls were launched twice every year and three times in 2023**. However, It is important to note that before the CAIS evaluation received in 2022, the calls related to European projects, specifically Transnational Access (TA) calls, were considered as Competitive Open Access before 2022 and Competitive Restricted Access after. This change of criteria for EU funded Competitive Access through TA not being recognised at national Spanish level was identified in the 2022 evaluation by CAIS and was related to the footnote N° 28 in Annex D of the "Agreement of the council for scientific, technological and innovation policy on the update of the map of unique scientific and technical infrastructures" from January 19, 2022. Footnote 28 indicates that since Spanish Researchers cannot access EU TA calls, TA Access should not be considered Competitive Access in Spain). We would like to respectfully request a revision of this consideration and the elimination of this footnote 28, to better align Spanish ICTS Strategies and Evaluation with the European Commission, which explicitly states that its TA Calls to Research Infrastructures (RIs) are intended to promote open access and fill gaps in the distribution of access to RIs across Europe. In other words, we firmly believe and request that since TA Access is the EU Competitive Access Framework, the accesses by EU researchers to the SOCIB glider fleet should be also considered as contributing to the Spanish ICTS System Competitive Access.

In any case, since early 2022, upon reception of the evaluation from CAIS in March 2022, SOCIB has been working hard to align access to the glider fleet with ICTS criteria by preparing specific calls and actively encouraging the technological and scientific community to become aware of availability of the glider infrastructure through the public Competitive Open Access calls. Thanks to this effort, the ICTS SOCIB has gradually improved the allocation of its glider fleet in Competitive Open Access during the 2021-2024 period, as detailed below:

In 2021, 2 applications were received and accepted under the Competitive Open Access calls. However, these applications were for execution in 2022, which resulted in **0 days at sea** in 2021. During the same period, **133 days at sea (23.3% of our capacity)** were executed under the Competitive Restricted Access category. Moreover, 1 application was received under the On-Demand Access protocol, which resulted in **420 days at sea (73.7% of our capacity)**.

In 2022, only 1 application was received under the Competitive Open Access calls, which could not be accepted due to technical feasibility. However, **113 days at sea (16.1% of our capacity)** were executed from the 2 applications received in 2021. These missions were executed in the framework of two projects: CALYPSO (highly competitive project, funded by ONR) and SMART. During the same period, 2 calls were launched under the Competitive Restricted Access category, which resulted in **112 days at sea (11.1% of our capacity)**. Moreover, 6 applications were received under the On-Demand Access protocol, of which 3 were accepted, resulting in **506 days at sea (72.3% of our capacity)**.

In 2023, all applications received under the Competitive Open Access protocol were accepted (5 applications), resulting in **82 days at sea (11.7% of our capacity)**. These missions were executed in the framework of two competitive projects: FaSt-SWOT and EBAMAR. During the same period, 2 calls were launched under the Competitive Restricted Access category, which resulted in **112 days at sea (16.0% of our capacity)**. Moreover, 1 application was received under the On-Demand Access protocol, of which 1 was accepted, resulting in **385 days at sea (55.0% of our capacity)**.

In 2024, demand exceeded our available capacity, and we were only able to accept 5 out of the 7 applications received under the Competitive Open Access protocol. This demand resulted in **6 missions** and **168 days at sea (24.0% of our capacity)**. These missions were executed in the framework

of five projects: ABACUS, CESMEC, SMART, CESCAB, and GLADIATOR. During the same period, 3 applications were received and accepted under the On-Demand Access protocol, resulting in **425 days at sea (60.7% of our capacity)**.

In 2025, a total of 190 requested days remain to be executed from the five accepted applications received in 2024 under the Competitive Open Access protocol, which represent **27.1% of our capacity**. These days will be offered to the following projects: GLADIATOR (90 days), MonSubHeat (45 days), CESMEC (30 days) and ABACUS (25 days).

Table 1. Annual distribution of access from 2021 to 2024, detailing number of calls and of applications received and accepted, and how operational days were allocated across the different access categories: Competitive Open Access (COA), On-Demand Access (ODA), and Competitive Restricted Access (CRA).

	2021	2022	2023	2024
Total Capacity (in days)	570	700	700	700
Total days in operations	553	697	579	593
Competitive Open Access (COA)				
Number of Calls	2	2	3	2
Number of Applications received	2	1	5	7
Number of Applications accepted	2	0	5	5
Number of Days	0	113*	82	168
% of Days under COA	**0.0%**	**16.1%**	**11.7%**	**24.0%**
Projects		CALYPSO SMART	FaSt-SWOT EBAMAR	ABACUS, CESMEC, SMART, CESCAB, GLADIATOR
On-Demand Access (ODA)				
Number of Calls Launched	1	1	1	1
Number of Applications received	1	6	1	3
Number of Applications accepted	1	3	1	3
Number of Days	420	506	385	425
% days under ODA	**73.7%**	**72.3%**	**55.0%**	**60.7%**
Competitive Restricted Access (CRA)				
Number of Calls Launched	0	2	0	0
Number of Applications received	0	4	0	0
Number of Applications accepted	0	4	0	0
Number of Days	133*	78	112*	0
% days under CRA	**23.3%**	**11.1%**	**16.0%**	**0.0%**

* days executed from applications received the year before.

With these strong foundations, SOCIB is fully prepared to provide the Glider Fleet in competitive access for 2025-2028, reaffirming its commitment to cutting-edge marine science, data accessibility, and operational excellence.

[E] Summary of scientific projects supported by SOCIB's Glider Facility

The Western Mediterranean is a dynamic and complex marine environment where sustained observational efforts are essential to understanding ocean variability, climate change impacts, and ecosystem responses. In this context, SOCIB plays a key role by providing its cutting-edge glider infrastructure to support international research projects, enhancing ocean monitoring, improving scientific knowledge, and contributing to global observation networks. Below is a brief description of the scientific projects carried out:

a) SMART Project: Sustained Monitoring of Water Mass Variability in the Western Mediterranean

Principal Investigator: **Dr. Jacopo Chiggiato** (CNR-ISMAR, Italy).

The **SMART project** continues the long-term monitoring of water mass variability in the Western Mediterranean, extending a successful collaboration between CNR-ISMAR and SOCIB since 2017. The study aims to sustain a repeated glider transect between Menorca and Sardinia, which has now been officially included in the OceanGliders Program as part of the Global Ocean Observing System (GOOS).

The primary scientific objectives are:

1. Monitoring long-term hydrographic variability of surface and intermediate water masses.
2. Investigating turbulence and small-scale mixing processes using a MicroRider profiler mounted on the glider.
3. Studying the transition layer between intermediate and deep waters, where thermohaline staircases form, a process influenced by the Western Mediterranean Transition (WMT) and climate-driven salinity changes.

The methodology involves deploying a 1000m-depth glider equipped with CTD and microstructure sensors, following a 30-day mission twice a year (Spring and Autumn 2023). Data collected will be integrated into SOCIB's operational data system (DAPP and THREDDS) and made publicly available through the OceanGliders data portal.

A comprehensive risk assessment and contingency plan has been established, considering maritime traffic, fishing activities, and adverse weather conditions. Emergency glider recovery will be coordinated between SOCIB and CNR-ISMAR, with immediate response capabilities in Spanish waters.

b) Calypso 2022 Project: Investigating Mesoscale and Submesoscale Dynamics in the Balearic Sea

Principal Investigator: **Dr. Simón Ruiz** (IMEDEA-CSIC, Spain).

The **Calypso 2022 project** aims to enhance our understanding of three-dimensional water parcel

trajectories and semi-Lagrangian object dispersion in the surface ocean, focusing on mesoscale and submesoscale frontal dynamics in the Balearic Sea. The project is part of the Departmental Research Initiative (DRI) CALYPSO, funded by the U.S. Office of Naval Research (ONR).

The key scientific objectives include:

1. Characterizing mesoscale ocean fronts in the Balearic Sea.
2. Quantifying vertical velocity fields associated with these fronts to improve the understanding of vertical transport and mixing processes.

The project deployed a SOCIB Slocum glider (G3 model) equipped with CTD, oxygen, and FL3 sensors, integrated into a multi-platform observational campaign alongside seven additional gliders, satellite remote sensing, and two research vessels (RV Pourquoi Pas? and RV Pelagia).

> The glider mission covered a repeated section between northern Mallorca and mainland Spain, reaching depths of up to 700 meters.

> The glider surfaced every 6 to 12 hours for data transmission, with adjustments based on marine traffic density and real-time oceanographic conditions.

> SOCIB glider data processing tool ensured real-time and post-mission analysis.

c) FaSt-SWOT Project: High-Resolution Monitoring of Fine-Scale Ocean Dynamics for SWOT Validation

Principal Investigator: **Dr. Ananda Pascual** (IMEDEA-CSIC, Spain).

The **FaSt-SWOT project** is designed to quantify and improve the understanding of fine-scale ocean dynamics (10–100 km) by integrating in-situ and satellite data with numerical models. The study is aligned with the Surface Water and Ocean Topography (SWOT) satellite mission, launched in December 2022, which provides high-resolution altimetric measurements of sea surface height.

The project deployed two SOCIB Slocum gliders in the Southern Balearic Sea during the SWOT fast-sampling phase, which lasts 90 days after launch. The scientific objectives included:

1. Resolving horizontal and vertical exchanges in mesoscale and submesoscale ocean features (e.g., eddies, meanders, and filaments).
2. Integrating glider data with SWOT observations for improved calibration/validation.
3. Utilizing AI-based data assimilation tools to enhance real-time observational strategies.

The methodology involves:

> Deployment of two gliders, each covering a transect parallel to the ship track (~10 km apart) and separated by ~25-30 km (1-day SWOT resolution equivalent).

> Repeated high-resolution sampling of temperature, salinity, oxygen, and fluorescence profiles down to 500–1000 m depth.

This mission contributed directly to SWOT's calibration activities, advancing knowledge of fine-scale ocean variability in the Mediterranean.

d) EBAMAR-PortoC Project – Investigating Coastal Carbon Cycling in the Western Mediterranean

Principal Investigator: **Dr. Gotzon Basterretxea** (IMEDEA-CSIC, Spain).

The **EBAMAR-PortoC project** focuses on monitoring carbon cycling processes in the neritic and oceanic waters off the east coast of Mallorca (Porto Colom area). The study aims to:

1. Assess anthropogenic impacts and their role in climate change-related biogeochemical alterations.
2. Analyze surface production-export dynamics, specifically organic matter transport to deep waters.
3. Enhance regional ocean observing capabilities, contributing to the Balearic Islands' long-term marine science strategy.

The project deploys a SOCIB Slocum glider equipped with CTD, oxygen, and FL3 sensors for:

> Two 25-day missions in Fall 2023, covering a 60 km cross-shore transect from Porto Colom to the open ocean.

> Sampling down to 1,000 m depth, surfacing every 6–12 hours.

> Real-time data processing and public dissemination via SOCIB's operational system (DAPP, THREDDS).

This project provides crucial high-resolution insights into carbon flux dynamics, reinforcing SOCIB's coastal and open-ocean biogeochemical monitoring network.

e) GLADIATOR Project: GLider observations NE of MenorcA to stuDy water mass and sedIment trAnsporT on a seasOnal basis in the North BaleaRic Current

Principal Investigador: **Phd. Marta Arjona** (University of Barcelona, Spain).

The **GLADIATOR project focuses** on monitoring hydrographic properties and sediment transport in the northeast sector of Menorca, with particular emphasis on the North Balearic Current. The study aims to:

1. Investigate seasonal variability in temperature, salinity, and oxygen levels by deploying gliders along predefined transects every three months.
2. Assess the distribution of suspended particulate matter (SPM) as an indicator of water mass differentiation, comparing glider turbidity data with pre-calibrated measurements from the RADMED project's Mahón hydrographic section.
3. Analyze the magnitude and variability of upper and intermediate water mass transport within the North Balearic Current, evaluating its role relative to the Balearic Channels in Western Mediterranean circulation.

The GLADIATOR project deploys a SOCIB Slocum glider equipped with CTD, oxygen, and optical sensors to monitor hydrographic properties and sediment transport in the northeastern sector of Menorca. The mission will include:

- Deployment near Porto Petro (south of Mallorca) by ICTS SOCIB pilots, activating real-time mission planning.
- Sampling from the surface to ~1,000 m depth, covering ~22 km per day through continuous zig-zag yo profiles.
- A subsequent 130 km transit to Menorca area over six days, followed by systematic cross-slope and along-slope transects within a defined closed box region to estimate geostrophic transport in the Balearic Current.
- Completion of the closed box pattern twice, covering 220 km over 10 days, before returning to the deployment site for recovery.

The full mission covers 570 km over 26 days, with an additional 3–4 days allocated for safe recovery, providing high-resolution insights into water mass dynamics and circulation in the Western Mediterranean.

f) CESCAB project: Cetacean Soundscapes in the Cabrera Archipelago National Park

Principal Investigador: **Dr. David March** (University of Valencia, Spain).

The general aim of the **CESCAB project** is to advance the development of near real-time automated systems using unmanned vehicles to simultaneously monitor cetaceans, ship-based activities and the marine environment in large marine protected areas. We have two specific objectives:

1. Monitor the presence of cetaceans in the Cabrera Archipelago Maritime-Terrestrial National Park, with a major focus on sperm whales and other deep-diver species.
2. Monitor underwater noise to characterize the acoustic footprint of ship-based activities.

The CESCAB project deploys a SOCIB Slocum glider equipped with DMON2 hydrophone, CTD, oxygen, and FLBBCDSLC sensors to monitor cetacean presence, ship-based activities, and the acoustic environment in the Cabrera Archipelago National Park:

- Two 28-day missions covering a large-scale marine protected area.
- Sampling from the surface to 1,000 m depth, between 15 m and 950 m.
- Glider surfacing every 12 hours for real-time data transmission and mission updates.

This mission provides high-resolution, real-time monitoring of cetacean distribution and ship-based acoustic impact, supporting conservation efforts in one of the Mediterranean's largest marine protected areas.

g) ABACUS project: Algerian BAsin Circulation Unmanned Survey

Principal Investigador: **Dr. Giuseppe Aulicino** (University of Naples Parthenope, Italy).

The **ABACUS project** aims to advance high-resolution, near real-time monitoring of oceanic circulation and water mass interactions in the southwestern Mediterranean Sea using unmanned glider technology. The project seeks to address critical knowledge gaps in the region's complex hydrodynamic processes, which play a key role in regulating mesoscale and sub-mesoscale dynamics:

1. Investigate the interaction between Atlantic and Mediterranean waters in the Algerian Basin, focusing on mesoscale eddies and their role in redistributing physical and biochemical properties.

2. Monitor the variability of surface and intermediate water masses using in situ observations, extending the ABACUS dataset from 2014 to 2024.
3. Deploy a deep-sea glider for three seasonal surveys (spring, late summer, late fall) along a SWOT satellite track, ensuring continuity in long-term data collection efforts.

The ABACUS project deploys a SOCIB Slocum G3 glider equipped with CTD, oxygen, FLNTU, PAR, turbulence sensors, a passive acoustic recorder, and a POCIS pollutant passive sampler to monitor mesoscale circulation, water mass interactions, and biochemical variability in the southwestern Mediterranean Sea:

> Three 22-day missions covering a 200 km transect between south of Mallorca and the northern boundary of the Algerian Current along the SWOT satellite ground track (passage 320).
> Sampling from the surface to 1,000 m depth, surfacing at every yo profile to capture very near-surface data for comparison with satellite observations.
> High-resolution monitoring of temperature, salinity, oxygen, turbidity, chlorophyll, and optical properties, with adjustable sampling rates for optimal battery efficiency.

This mission will provide detailed insights into large-scale circulation patterns, mesoscale eddy formation, and biophysical interactions in the Algerian Basin, extending long-term monitoring efforts from 2014 to 2024 and supporting future climate and ecosystem studies.

h) CESMEC project: Cetacean Soundscapes in the Mediterranean Cetacean Corridor

Principal Investigador: **Dr. David March** (University of Valencia, Spain).

The general aim of the **CESMEC project** is to advance the development of near real-time automated systems using unmanned vehicles to simultaneously monitor cetaceans, ship-based activities and the marine environment in large marine protected areas. We have two specific objectives:

1. Monitor the presence of cetaceans in the Mediterranean Cetacean Corridor, with a major focus on fin whales and dolphins.
2. Monitor underwater noise to characterize the acoustic footprint of ship-based activities.

The project deploys an ocean glider equipped with a hydrophone (DMON2), CTD, oxygen, and FLNTU sensors for:

> A 30-day mission in the Mediterranean Cetacean Corridor (MCC), following a triangular route between Sóller, Vilanova i la Geltrú, and Columbretes Islands to monitor cetaceans and underwater noise.
> Sampling down to 1,000 m depth, recording bioacoustic signals, environmental variables, and collecting eDNA samples at key locations.
> Data processing using PAMGuard and PAMGuide, integrating results with ship-based surveys, fin whale models, AIS-derived noise models, and aerial drone observations.

The mission aims to provide a comprehensive and real-time understanding of cetacean distribution and the impact of human activities on marine ecosystems.

3

ANNEX I. CAIS EVALUATION REPORT

CAIS — COMITÉ ASESOR DE INFRAESTRUCTURAS SINGULARES

EVALUATION REPORT

Model A – 2021 Stage 1

REF: MAPAICTS-2021-028/SOCIB

Infrastructure:	Sistema de Observación Costero de las Illes Balears (SOCIB)
Tipology:	Single-sited
Status:	Operating
Type of Report:	ICTS Map update – Final report

I. SCOPE

The Sectorial Committee of the Scientific, Technological and Innovation Policy Council has agreed that, in the 2021 ICTS Map update process, those "Unique Scientific and Technological Infrastructures" (hereafter, ICTS) that succeeded in the previous evaluation and became part of the ICTS Map 2017-2020 will be exempted from phase 1 evaluation, aimed at verifying the compliance with the ICTS criteria and requirements. This exemption applies to the infrastructure referred to in the header.

Accordingly, the scope of this report is limited to the assessment of the changes happened on the infrastructure configuration, its performance in the competitive open access offer from 2017 to date, the Strategic Plan of the ICTS and, when relevant, the degree of implementation of the improvements proposed by CAIS in previous evaluation reports.

II. REPORT

B.1. Uniqueness and strategic character[1]

B.1.1. Modifications to Infrastructure / Hardware configuration

ICTS SOCIB is a multi-platform multidisciplinary and integrated ocean observing system that provides streams of data, added value products, and forecasting services from the coast to the open ocean. In this way, SOCIB is a leading research institution in Mediterranean marine sciences that contributes to state-of-the-art science, implements new technologies, and responds to society needs and challenges.

Following recommendation from the previous CAIS evaluation, the ICTS SOCIB has reorganized in two Outstanding Facilities: (1) **the SOCIB RI**, which includes the fixed stations facility, the lagrangian platform facility, the HR radar facility, the RV SOCIB Endurance cruises, glider facility Endurance lines, the beach monitoring facility, the Modelling & Forecasting Facility, and the data center facility; and (2) **the SOCIB Glider Facility** for competitive access. In addition, it operates the outstanding facility RV SOCIB of the ICTS FLOTA. The panel considers the new two outstanding facilities more clearly define the two main activities of SOCIB: in one hand the collection and open access to

[1] Only the modifications on the ICTS configuration since the last evaluation are assessed hereby, particularly those regarding any modifications proposed in the list of 'outstanding' facilities.

observational data, and on the other hand the glider facility that is open to competitive access.

B.2. Open competitive access to the ICTS facilities[2]

Open access website

The SOCIB website is easy to navigate and the information regarding open access protocol and open national and international calls for ICTS SOCIB is easily accessed in (https://socib.es/?seccion=gliderCompetitiveAccess&facility=gliderGeneralOverview). It also provides information about how to access the SOCIB free services (Forecasting and Modelling, Data Center Facility, and Beach Monitoring Facility). Following previous CAIS recommendations, SOCIB has developed and implemented different tools for access metrics, with the new ICTS SOCIB Data API (http://api.socib.es/home) requesting to fill user registration form integrated in the ICTS SOCIB metrics system starting in 2021. These changes are welcomed by the Committee.

The panel notes that, although the web contains all information regarding 2021, no information appears available regarding open calls, applications received, funded and implemented for the previous years. This information should be made available for transparency.

Open access policy

The open access policy/protocol for competitive open access of the facilities can be found at: https://socib.es/?seccion=competitiveAccess.

In addition, a document with the policy for non-competitive open access to data is available at: https://www.socib.es/?seccion=dataCenter&facility=accessPolicy

Open access committee

The Open Access Committee includes four members clearly identified in the guideline document for competitive access that can be accessed at:

https://www.socib.es/files/SOCIB_External_Users_Competitive_Access_Protocol_Guidelines_update_june2020.pdf

Of the four members, only one member is from SOCIB. To avoid potential conflicts of interest, if any of the members of the Access Committee participate in an application submitted SOCIB, they will not contribute to the evaluation process. It would be desirable to know if this member is then substituted by another expert from another institution. More importantly, conflicts of interest arising from members of the Open Access Committee being from the same groups/institutions than applicants should be addressed. This could be achieved by having a larger number of members in the Access Committee from different institutions and choosing which four will conduct the evaluations based on the applications received.

Competitive open access offered in 2017-2020

Competitive access to the RV SOCIB facility is managed by the ICTS FLOTA, so it is not addressed in this report.

[2] The Open competitive access offer and performance over the period 2017-2020 is analysed, together with the ICTS capacity to grant access and its users demand.

CAIS COMITÉ ASESOR DE INFRAESTRUCTURAS SINGULARES

During the period 2017-2020, the ICTSDATA shows 23 applications to access the glider facility. Of these, 22 accesses were approved (Table 1). Based on the data provided, of the 22 accesses 13 appear to be through externally managed calls even though they appear to be incorrectly assigned to the internal SOCIB open calls. In order to avoid confusion this should be clarified in the future. In addition, 8 of the 22 accesses could not be executed during the 2017-2020 period because of meteorological or technical issues. These access translate in a total of 1301 glider-days. Of these, 894 days (i.e. 68,7%) have been ICTS SOCIB internal campaigns, and 407 days (i.e. 31,3%) have been through competitive access (31,3%). A complete list of missions, projects, applicant institutions, and funding agencies behind these missions should be provided. For example, the applicant´s institution is not easily tracked for the JERICO S3/NEXT projects. It is striking that, based on all the data provided by SOCIB, most accesses to the glider facility are from European/international institutions, with only one Spanish institution applying for open competitive access, the IMEDEA-CSIC. In addition, the total number of international institutions (through repetitive applications and accesses) accessing the facility are 8. Strategies to boost the applications from Spanish institutions would be desirable.

Table 1: Yearly account of granted and implemented accesses

	2017	**2018**	**2019**	**2020**	**TOTAL**
Granted access	8	7	1	6	22
Implemented access	4	4	1	5	14

Open access to the SOCIB RI Open Data included in the ICTS Map 2017-2020 (i.e., Observing Data System, Beach Monitoring Facility y Modelling & Forecasting Facility) is not competitive in nature since no evaluation for the accesses is required. Following recommendations from the previous CAIS evaluation, SOCIB has developed and implemented a system that allows a better follow up of the accesses and usage of the open data. This effort is evaluated very positively. In most cases, the institution accessing the data can be identified (i.e., in 514 of the 557 of THREDDS, 6 of the 127 in SOCIB, and all in BMF, could be identified). It would be however desirable that the projects accessing the data could also be tracked. The strategic plan includes strategies for improvement of tracking open data access. According to ICTSDATA the accesses for data are illustrated in Table 2.

Table 2: Access to SOCIB Open Data

	2017	2018	2019	2020	Total
THREDDS	128	133	104	192	557
WEB	0	0	0	15	15
BMF	1	1	4	7	13
Total	129	134	108	214	585

Open access calls 2017-2020

There are two types of calls for access to SOCIB facilities:
(1) calls managed by SOCIB for which they have been 2 calls per year, except for 2019, when there was only one call. The panel was unable to find information regarding how many applications where received for every call launched (including the name-s of the PI-s and their institutions), which ones were approved, and which ones finally implemented. This kind of information is not only relevant for the evaluation of the ICTS but also for internal evaluation of the facilities and planning for future objectives and investments.
(2) calls managed externally, such as those associated to Transnational access within H2020 (e.g., TNAs JERICO NEXT, JERICO S3, etc). Because the evaluation process is different, accesses to the facilities associated to these calls should be clearly separated from those managed directly by SOCIB.

In addition, SOCIB has issued three types of non-competitive calls to data in the three data portals: THREDDS data: https://thredds.socib.es; SOCIB data: https://www.socib.es and data and images from the beach monitoring facility: https://www.socib.es/?seccion=observingFacilities&facility=beachMonitoring

Complementary Access services

The Access granted to a specific experiment generally includes support from SOCIB on mission preparation and setup, training and logistical, technical, data management and scientific advice. The specific complementary services to users provided by SOCIB are listed in the guideline document for competitive access.

Users Demand

Based on the ICTSDATA, appears that all the applications for access to the glider facility received were granted even though around 36% of the projects have not been implemented because of different reasons. These numbers suggest there is no over demand of the glider fleet. Although there has been an increase in the number of applications for open competitive access to the Glider Facility since the last evaluated period of the ICTS, the number continues to be considered low if we take into consideration that the 22 accesses are from 8 institutions and of them, only one Spanish institution. In the “Análisis de Acceso” document it is mentioned that with the human resources available, the number of accesses are close to the maxima the glider facility can provide. This is a relevant aspect when taking into considerations some of the planed strategies and actions in the 2021-2024 Strategic Plan.

The demand of the open data shows the users are from more than a hundred public, private, national and international institutions.

B.3. Production and performance: *not assessed in 2021 evaluation*

B.4. Strategic Plan 2021-2024

B.4.1. Strategic Plan Assessment

CAIS COMITÉ ASESOR DE INFRAESTRUCTURAS SINGULARES

The previous strategic plan of SOCIB has been, largely implemented, with the ICTS reporting 94% of expected activities completed, in the final execution stages or partially completed.
In respect to the new Strategic Plan, it is detailed and comprehensive and addresses recommendations from the previous CAIS evaluation and of the last meeting by the International Scientific Steering Committee ISCC. Based on this and the SWOT analysis, the Strategic Plan 2021-2024 contains 6 objectives that are mostly related to enhancing and consolidating the open-access to real-time and quality-controlled oceanographic data. and to increasing their visibility and accessibility by professionals and citizens. For this, SOCIB plans to maintain and enhance the existing observing and forecasting capabilities (i.e., SOCIB High Frequency Radar Facility, Langrangian platforms, fixed coastal stations, etc). The objectives in the Strategic Plan are also aimed at supporting and contributing to marine scientific excellence in order to maximize the social and economic impact and value of the sustained time series and oceanographic observations. In addition, the Strategic Plan aims to build on the already successful communication activities of the ICTS SOCIB to engage the public with understanding the relevance of ocean sciences.

To fulfill the 6 objectives, 24 strategies aligned with the SWOT analysis and 96 specific actions related to each of the strategies are presented. The number of activities seems high when considering that in the SWOT one of the listed weaknesses is the limited scientific, operational and technical staff and how this affects SOCIB activity. To address this very serious shortcoming Action 6.2.1 aims to “promote measures to recruit and retain talent, and provide continuous training for employees” although there is no specific indication on the mechanisms to recruit (specific calls/contracts schemes). In any case, to follow up the implementation of the actions in the Strategic Plan, a Monitoring Commission formed by the heads of the Facilities and Services is to be established. A list of 157 indicators is provided in the Strategic Plan that it will be used for the ongoing evaluation by the Commission. The Commission will elaborate an Annual Plan Follow-up Evaluation Report that will be submitted for approval to the Executive Committee, the Board of Trustees and the International Steering Committee.

The objectives, strategies and actions are well aligned with the mission and vision of the ICTS. However the panel notes that one of the outstanding facilities of the ICTS, the Glider fleet, only accounts for a small part of the Objectives/Strategies. Within Strategy 1.3, two specific actions aim at increasing the number of competitive open accesses to the ICTS unique facilities: RV SOCIB (which is an outstanding facility of the ICTS FLOTA, not in the ICTS SOCIB) and the fleet of Gliders, mainly through the launch on new calls. However, the Descriptive Report provided emphasizes that the challenge of boosting demand and supply of gliders projects is the low number of glider technicians (2 at this time) to operate them. Also, the “Análisis de Acceso” document states that with the human resources available, the number of accesses are close to the maxima the glider facility can provide.

The value of some indicators should be reassessed, for example the data volume downloaded from the SOCIB servers increases as a result of better model resolution for a single forecast. CTDs can be deep or very shallow so the number of CTDs is neither a good indicator of activity/use. This is especially important for the unique infrastructures of the ICTS SOCIB (gliders and RV SOCIB in ICTS FLOTA) because the demand and the access to these facilities is not very high. For example: “number of international monitoring missions” and “number of missions performed”. should differentiate between total number of missions, national missions, international missions, open access

competitive calls missions, private missions, etc (some of these contemplated by indicators 53-55). Indicator 57 "total number of applications" this is relevant to understand what is the true demand for the infrastructure and should differentiate between open competitive calls (national and international) and other applications. It will also be relevant to know the number of funded applications and of those, how many are finally implemented. Indicator 59. "number of accesses" should clearly state what is the measure for an access (days while implementing a specific project? What about transits, days of mobilizations and demobilization? Etc.).

The Descriptive Report and the Strategic Plan provided by SOCIB, clearly shows that SOCIB is a leading research institution in Mediterranean marine sciences. However, the question arises regarding if it the SOCIB glider fleet continues to adequately meet the criteria for classification as an outstanding facility of the ICTS. The open competitive access to this facility continues to be limited and gliders are now becoming standard oceanographic equipment in many research labs. This circumstance was already brought out by CAIS in 2017 evaluation report, where the limited demand of the glider facility for competitive access was evident, and the need to adopt strategies to boost it was requested by CAIS. After three years the situation has not progressed sufficiently. These facts, together with the limited users demand observed and the constrains in human resources to expand further the gliders service provision, advise to remove the Glider Facility from the 'Outstanding facilities' list of SOCIB. Such a removal would imply releasing the obligation of providing open competitive access to this facility by SOCIB in the 2021-2024 period. In this way, the ICTS will be able to focus on the Data acquisition and provision services, that is, the "OBSERVING DATA SYSTEM" outstanding facility, which is becoming the actual core of SOCIB, thus devoting primarily the glider facility to endurance lines. Notwithstanding this, should SOCIB wish to request the re-incorporation of the glider facility to the 'Outstanding facilities' list, this could take place in 2024 prior demonstration that the facility has been voluntarily kept open over the 2021-2024 period to the competitive access by external users and that the resulting indicators of access are good enough to justify such a re-incorporation.

Additionally, Strategy 4.2.12 aims to "develop a strategic long-term plan of ocean integration", and part of this strategy could consider the opportunity presented by the integration of the IEO in the CSIC and the CSIC now being part of the SOCIB consortium, to agglutinate the management of seagoing infrastructures and equipment for open competitive access.

As for the Strategic Plan submitted, the general assessment is positive. However, the committee considers that the ICTS should take into account the remarks expressed above.

B.4.2. Investment plan Assessment

As for the Investment Plan submitted, it contains a large number of lines (66), none of which being already funded or having requested funds for yet. Four lines (ICTS_SOCIB_GF_003, ICTS_SOCIB_GF_008, ICTS_SOCIB_GF_010, ICTS_SOCIB_GF_013) are not eligible as they refer to elements (rechargeable batteries) that should be covered by operating funds. On the other hand, a number of lines are not eligible either as they lack the character of high-technology-content investments (ICTS_SOCIB_ETD_002, ICTS_SOCIB_GF_009). This also applies to the lines related to the construction of the new SOCIB Headquarters (ICTS_SOCIB_New_Building_01, ICTS_SOCIB_New_Building_02, ICTS_SOCIB_New_Building_03 ICTS_SOCIB_New_Building_05) or to the basic

general infrastructure of the SOCIB consortium (ICTS_SOCIB_IT_004, ICTS_SOCIB_IT_005), which should be accomplished by institutional funds. Lastly, there is a certain redundancy to be clarified in the acquisition of IT equipment for the ICTS services, particularly lines ICTS_SOCIB_IT_002, ICTS_SOCIB_IT_010, ICTS_SOCIB_IT_012 and ICTS_SOCIB_IT_013, which apparently are not located in SOCIB premises. Finally, one investment line is removed because it is already considered in the RedIRIS 2021-2024 Strategic Plan (ICTS_SOCIB_New_Building_06).

Excluding the above, it is only necessary to reprioritize three lines: ICTS_SOCIB_GF_007 to MEIDUM priority, and ICTS_SOCIB_GF_011 and ICTS_SOCIB_GF_012 to LOW priority This is due to the fact that all they form part of a general plan to acquire regularly AUVs and gliders science bays, which starts in 2021 with investments ICTS_SOCIB_GF_001 and ICTS_SOCIB_GF_002 with HIGH priority, so naturally the subsequent acquisitions in 2022 and 2024 should have lower priority. Furthermore, the expansion of the glider fleet should be justified on the basis of its actual need (either increasing needs for endurance lines, or continuous requests of gliders from targeted research studies), and should be in accordance with the ability to hire new technicians that in turn allow to increase the capacity of the operations.

As a result of the above, a list of 48 lines amounting 7,9 M EURO is shown in Annex C, properly prioritized according to the guidelines provided that result in the following ratios:

Priority level	% HIGH	% MEDIUM	% LOW
SOCIB	52%	12%	36%

B.5. General objectives of the infrastructure: *not assessed in 2021 evaluation*

B.6. Scientific and Technical Advisory Committee report on SP

The SOCIB International Scientific Steering Committee (ISSC) reports on their own SWOT analysis of the ICTS SOCIB during a virtual meeting in December 2020 that connects with the SWOT analysis presented in the Strategic Plan 2021-2024. Both, the ISSC evaluation and the SOCIB Descriptive Report document, detail how the different recommendations by the ISSC have been incorporated in the ICTS SOCIB Strategic Plan 2021-2024 Strategies and Actions. They consider the timetable for achieving the objectives ambitious but realistic and well structured. Nevertheless, the report mentions that for some of the monitoring indicators of the Activities it would be desirable to provide thresholds associated with them in order to measure the degree of success.
With regards to the Investment Plan request for the need for a 20% increase in human resources, the ISSC mentions that further details regarding profiles needed would have been desirable.
The ISSC concludes that their core recommendations have been mostly followed and will be revised in the next ISSC meeting.

B.7. Management schemes: *not assessed in 2021 evaluation*

B.8. Staff: *not assessed in 2021 evaluation*

B.9. Funding: *not assessed in 2021 evaluation*

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C. Statements and commitments: *not assessed in 2021 evaluation (2018's Statements and commitments remain in force)*

III. CONCLUSIONS.[3]

In summary, the result of the evaluation of Sistema de Observación Costero de las Illes Balears (SOCIB) as a standalone ICTS is positive.

The following considerations should be taken into account during the 2021-2024 period

1. The configuration of the ICTS is modified according to Annex A, which focus in the acquisition and provision of observing data through the SOCIB RI System. The glider fleet and the RV SOCIB become important facilities within SOCIB ICTS in support of that objective.
2. Regarding the Glider facility competitive access calls, should they continue voluntarily in the following 2021-2024 period, the Committee encourages SOCIB to provide in their website a complete list of applications received, approved projects and those implemented. At a minimum, the list should include the applicant institution and funding agencies.
3. The Committee encourages SOCIB to continue the improvement efforts made over the 2017-2020 period to develop and implement a tracking system of usage of the open data made available to the scientific community and society, with a particular focus on the identification of the R&D projects accessing the data.

The list of facilities of the infrastructure under evaluation, which have been qualified as 'Outstanding Facilities' by this Committee, is shown in the Annex A to this report

The ratings reached in each section are summarized in the table shown in Annex B to this report.

The list of investments (including all levels of priority, either high, medium or low) is shown in Annex C to this report.

[3] Including comments on implementation by the ICTS of improvements or changes proposed by CAIS in previous evaluation reports, when relevant.

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COMITÉ ASESOR DE INFRAESTRUCTURAS SINGULARES

ANNEX A: List of 'Outstanding Facilities'

Sistema de Observación Costero de las Illes Balears (SOCIB)

Node / RI	Code	Outstanding facilities
SOCIB	SOCIB-OF-1	SOCIB RI SYSTEM (previously called OBSERVING DATA SYSTEM), including: - Data Center Facility - Fixed Stations Facility - Lagrangian Platforms Facility - HF Radar Facility - R/V SOCIB Endurance cruises - Glider Facility Endurance lines - Modelling and Forecasting Facility - Beach Monitoring Facility

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COMITÉ ASESOR DE INFRAESTRUCTURAS SINGULARES

ANNEX B: Final result of the evaluation

INFRASTRUCTURE	**SISTEMA DE OBSERVACIÓN COSTERO DE LAS ILLES BALEARS**
REFERENCE	MAPAICTS-2021-028/SOCIB
STATUS	**OPERATING**
TIPOLOGY	**SINGLE-SITED RI** (Pre-existing ICTS)

A. QUANTITATIVE CRITERIA

1) Investment and operating costs	0. Not assessed

B. QUALITATIVE CRITERIA

1. ICTS Uniqueness and strategic character	0. Not assessed
i. Infrastructure/hardware configuration (incl. modifications)	b. Advanced
ii. Technology	0. Not assessed
iii. Natural environment (when relevant)	0. Not assessed
iv. Research services	0. Not assessed
v. Added value to Spanish R&D&Innovation	0. Not assessed
vi. Strategic character	0. Not assessed
vii. Uniqueness	0. Not assessed

2. Open competitive access	**b. Good**
i. Open Access website	b. Good
ii. Open Access protocol / policy	a. Excellent
iii. Open Access committee	a. Excellent
iv. Competitive open access offered over 2017-2020	c. Acceptable / Improvement required
v. Open access calls 2017-2020	c. Acceptable / Improvement required
vi. Complementary access services	b. Good
vii. Users demand	c. Acceptable / Improvement required

3. Production and Performance	0. Not assessed
i. Publications	0. Not assessed
ii. Projects participation	0. Not assessed
iii. Technology transfer	0. Not assessed
iv. Collaborations	0. Not assessed
v. Outreach activities and materials	0. Not assessed
vi. Training activities	0. Not assessed

4. Strategic Plan 2021-2024	**a. Excellent**
i. Fulfillment previous Strategic Plan	a. Excellent
ii. Objectives	a. Excellent
iii. Strategies	a. Excellent
iv. Resources and sustainability	b. Good
v. Future actions/investments	a. Excellent

5. General objectives of the infrastructure.	0. Not assessed
6. Scientific & Technical Advisory Committee (Strategic Plan Report)	a. Positive STAC report on SP
7. Management schemes (particularly for RI and external users' support)	0. Not assessed
8. Staff (particularly for RI and external users' support)	0. Not assessed
9. Funding (2017-2020)	0. Not assessed

C. STATEMENTS AND COMMITMENTS

1. Public Ownership	0. Not assessed
2. Open Composition	0. Not assessed
3. Future open competitive access offer	0. Not assessed

Information provided by the infrastructure under evaluation

Information provided by the RI in the Description Report	b. Good
Information provided by the RI in the Strategic Plan and action plan	a. Excellent
Information provided by the RI in ICTSDATA	b. Good

CONCLUSION

Positive evaluation on continuity in the ICTS Map as a stand-alone infrastructure
Strategic Plan positively evaluated

CAIS

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ANNEX C: List of investments

Sistema de Observación Costero de las Illes Balears (SOCIB)

CODIGO	NODO	NOMBRE	PRIORITY
ICTS_SOCIB_FSF_001	N.A	Acquisition of 3 oceanographic buoys	HIGH
ICTS_SOCIB_FSF_002	N.A	Update and renew SeaLevelStations	HIGH
ICTS_SOCIB_ETD_001	N.A	Acquisition of a small boat (6 metre) with outboard engine and trailer	HIGH
ICTS_SOCIB_ETD_003	N.A	Acquisition of motion sensor and RTK system for bathimetry applications and geolocation.	HIGH
ICTS_SOCIB_LPF_001	N.A	Updating the lagrangian fleet Projects (SVP)	HIGH
ICTS_SOCIB_LPF_002	N.A	Updating the lagrangian fleet Projects (Argo floats)	HIGH
ICTS_SOCIB_IT_001	N.A	Acquisition of two General Servers for virtualization	HIGH
ICTS_SOCIB_IT_003	N.A	Deploy a cloud backup system . Phase 1	HIGH
ICTS_SOCIB_IT_006	N.A	Acquisition of additional storage capacity for SOCIB unified storage system. Phase 1	HIGH
ICTS_SOCIB_IT_007	N.A	Acquisition of a new local backup storage system at SOCIB data center facility	HIGH
ICTS_SOCIB_IT_08	N.A	Update SOCIB HFR IT Infrastructure	HIGH
ICTS_SOCIB_IT_09	N.A	Acquisition of new SOCIB General Servers for Virtualization.	HIGH
ICTS_SOCIB_IT_011	N.A	Deploy a cloud replicated datacenter. Phase 2	HIGH
ICTS_SOCIB_IT_014	N.A	Acquisition of additional storage capacity for SOCIB unified storage system (avalon). Phase 2	HIGH
ICTS_SOCIB_MFF_001	N.A	Computing server for the Modelling Facility	HIGH
ICTS_SOCIB_MFF_002	N.A	Computing cluster for the Modelling Facility	HIGH
ICTS_SOCIB_MFF_003	N.A	High-performance computing server for the Modelling Facility	HIGH
ICTS_SOCIB_BMF_001	N.A	BMF renewal of instrumentation	HIGH
ICTS_SOCIB_BMF_002	N.A	RasPiCam system	HIGH
ICTS_SOCIB_BMF_003	N.A	CoastSnap Project	HIGH
ICTS_SOCIB_BMF_004	N.A	BMF Renewal of current stations infrastructure	HIGH
ICTS_SOCIB_BMF_005	N.A	Real-Time Wave Acoustic profiler	HIGH
ICTS_SOCIB_BMF_006	N.A	Laser Grain-Size Analyzer	HIGH
ICTS_SOCIB_BMF_007	N.A	Sediment drying oven	HIGH

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COMITÉ ASESOR DE INFRAESTRUCTURAS SINGULARES

CODIGO	NODO	NOMBRE	PRIORITY
ICTS_SOCIB_BMF_008	N.A	Beach Monitoring computational module	HIGH
ICTS_SOCIB_BMF_009	N.A	RTK-GPS System	HIGH
ICTS_SOCIB_BQ_001	N.A	CDOM sensor for the CTD	HIGH
ICTS_SOCIB_BQ_002	N.A	UV absoprtion nitrate sensor either a) off the shelf or b) development for low concentration Mediterranean waters and science bay glider operation	HIGH
ICTS_SOCIB_BQ_003	N.A	Backup bio CTD sensors, dissolved oxygen and a Y cable	HIGH
ICTS_SOCIB_BQ_004	N.A	Bio-UCTD	HIGH
ICTS_SOCIB_BQ_005	N.A	Spectrophotometer with quartz cuvettes	HIGH
ICTS_SOCIB_BQ_006	N.A	CDOM ultrapath meaurement system	HIGH
ICTS_SOCIB_BQ_007	N.A	Backup for oxygen titration (oxygen cell Metrohom) and alkalinity cell	HIGH
ICTS_SOCIB_BQ_008	N.A	Flow cam system	HIGH
ICTS_SOCIB_BQ_009	N.A	Microscope	HIGH
ICTS_SOCIB_BQ_010	N.A	Flow cytometer	HIGH
ICTS_SOCIB_GF_001	N.A	Glider 2021	HIGH
ICTS_SOCIB_GF_002	N.A	Glider Science bay 2021	HIGH
ICTS_SOCIB_GF_004	N.A	Hydrophone sensors	HIGH
ICTS_SOCIB_GF_005	N.A	Pressure chamber	HIGH
ICTS_SOCIB_GF_006	N.A	Portable CTD	HIGH
ICTS_SOCIB_GF_007	N.A	Glider 2022	MEDIUM
ICTS_SOCIB_GF_011	N.A	Gliders 2024	LOW
ICTS_SOCIB_GF_012	N.A	Glider Science bay 2024	LOW
ICTS_SOCIB_HFR_001	N.A	Renewal of the HFR-Ibiza network infrastructure	HIGH
ICTS_SOCIB_HFR_002	N.A	New HFR radial sites Installation in Cap de la Nau	MEDIUM
ICTS_SOCIB_HFR_003	N.A	Upgrading of the CODAR SeaSonde software for HFR-Ibiza	HIGH
ICTS_SOCIB_HFR_004	N.A	Acqusition of satellite-tracked Lagrangian surface drifters	HIGH
ICTS_SOCIB_New_Building_04	N.A	NEW BUILDING: scientific equipment	LOW

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ANNEX II. COMPLIANCE OF STRATEGIC PLAN 2021-2024

1. INTRODUCTION

The Balearic Islands Coastal Observing and Forecasting System (ICTS SOCIB) has steadfastly pursued the objectives set forth in its **Strategic Plan 2021-2024**, reinforcing its role as a leading institution in oceanographic research and innovation. Over the past four years, SOCIB has effectively executed 86.5% of its planned actions, successfully completing 83 out of 96 initiatives. This remarkable accomplishment underscores the organization's dedication to advancing marine and coastal research, strengthening operational capacities, and fostering societal engagement.

The compliance and performance of ICTS SOCIB reflect a comprehensive and structured approach, emphasizing six key objectives:

- **Enhancing ocean observing and forecasting capacities:** SOCIB has significantly advanced its observing and forecasting systems, ensuring the provision of high-quality, real-time ocean data to support scientific research and decision-making processes.
- **Boosting data visibility, accessibility, and usage:** By reinforcing open-access policies and developing innovative data management tools, SOCIB has improved the usability and dissemination of oceanographic data to researchers, policymakers, industry, and the general public.
- **Promoting socio-economic and environmental impact:** Through the development of value-added ocean products and services, SOCIB has translated scientific knowledge into actionable solutions that address critical environmental and societal challenges.
- **Supporting excellence in marine and coastal research:** Strengthening collaborations at regional, national, and international levels, SOCIB has fostered high-impact research initiatives, contributing to the global understanding of ocean dynamics.
- **Encouraging societal engagement and promoting ocean literacy:** Educational programs, outreach activities, and public engagement initiatives have played a crucial role in raising awareness about the ocean's significance and the importance of sustainable marine governance.
- **Enhancing organizational structure and efficiency:** Internal improvements, strategic investments, and governance optimization have ensured the effective functioning of SOCIB, reinforcing its ability to achieve long-term research and innovation goals.

The successful execution of these objectives has been achieved despite the inherent complexities of oceanographic research and its implementation in policy and societal frameworks. Notable achievements include advancements in ocean forecasting, the enhancement of high-resolution ocean models, and the implementation of state-of-the-art tools for sustainable marine governance. Additionally, increased collaborations with regional, national, and international institutions have amplified the impact of SOCIB's initiatives, fostering a robust and interconnected research community.

Detailed insights into the compliance of each strategic objective, along with the corresponding assessments and justifications, are presented in subsequent sections, ensuring transparency and

accountability in reporting progress. Furthermore, the performance of ICTS SOCIB during this period is further illustrated through key figures and metrics, showcasing its operational excellence and commitment to sustainability, innovation, and scientific progress.

2. COMPLIANCE OF STRATEGIC PLAN 2021-2024

Over the past four years, the Balearic Islands Coastal Observing and Forecasting System (ICTS SOCIB) has demonstrated a strong commitment to its **Strategic Plan 2021-2024**, achieving an **86.5% execution** rate by successfully **completing 83 out of 96 planned actions**. This accomplishment underscores the dedication and efficiency of the organisation in fulfilling its strategic objectives.

A detailed examination of the achievements reveals a comprehensive approach to enhancing the ICTS SOCIB's capabilities and impact. Notably, Objectives O4, O5, and O6, focused on promoting research excellence, engaging society, and strengthening the organizational structure, have been mostly realized. This success signifies the organization's commitment to both internal growth and external influence within the research community and broader society.

Furthermore, substantial progress has been made in the areas of ocean observation (O1), data accessibility (O2), and socio-economic impacts (O3), with each objective exceeding a 70% execution rate. This progress is particularly noteworthy due to the inherent complexities and challenges associated with oceanographic research and its translation into tangible benefits for society.

Among the key achievements is enhancing oceanographic forecasting systems, crucial for predicting ocean dynamics and their impacts on coastal communities and marine ecosystems. Advancements in ocean literacy and public engagement initiatives demonstrate ICTS SOCIB's dedication to fostering a deeper understanding and appreciation of the ocean's significance. Furthermore, the implementation of new tools and strategies to support sustainable ocean governance underscores the translation of scientific knowledge into actionable solutions for pressing environmental challenges. Additionally, the development of high-resolution ocean models offers valuable insights into complex ocean processes, while updated data management policies ensure the accessibility and long-term preservation of essential oceanographic data.

Critically, fostering collaborations with regional, national, and international stakeholders has enabled the ICTS SOCIB to leverage expertise and resources, maximizing its impact and reach. These collective efforts reflect the organisation's commitment to addressing both scientific and societal challenges related to marine and coastal environments.

Detailed information on the compliance of each objective is provided in the accompanying tables, offering a comprehensive overview of the strategies, actions, assessments, and justifications undertaken. The inclusion of references to means of verification, such as reports, publications, and online resources, ensures transparency and accountability in reporting progress.

Objective 1. Enhance ICTS SOCIB's ocean observing and forecasting capacities and reinforce competitive open access

Action	Assessment	Comments/Justification (means of verification)
Strategy 1.1. Update and maintain existing observing and forecasting capabilities		
1.1.1. Update and maintain Glider fleet	Achieved	During the period 2021 to 2024, SOCIB has acquired 2 gliders and 4 science bays in 2021 to update and maintain our glider fleet. In this period two of our gliders have been outdated and in the same time during one of our operations we lost one glider in the Ibiza channel in 2021. During this period we have also increased the number of missions in our quasi - endurance lines from 4 in the period 2017-2020 to 9 missions for the period 2021-2024. In terms of numbers: i) gliders available - 7 gliders; ii) missions performed - 65 until 31/12/2024; iii) days of glider operations - 2,422 glider days until 31/12/2024; iv) nautical miles flown - 28876 nm until 31/12/2024; v) CTD profiles - 79,575 profiles until 31/12/2024.
1.1.2. Upgrade and maintain R/V SOCIB monitoring systems	Not achieved	In the period 2021-2024 the R/V SOCIB has continued to function adequately. Some of the instruments proposed in the PE21-24 have been incorporated or renewed, however, some others could not be implemented (due to lack of budget, as they were subject to competitive calls and lack of personnel). Specifically, the SBE21 thermosalinometer was renewed in 2022, and since then there has been one in operation and another in reserve, which can be calibrated without affecting the ship's operation. Funding has not been obtained for the acquisition of a uCTD unit or the multi-frequency echo sounder.
1.1.3. Update and maintain Fixed stations	Achieved	In the period 2021-2024, several actions have been carried out to keep the fixed stations that provide data to SOCIB operational. Specifically, during the years 2022 and 2023, work has been carried out to standardise the instruments and communication systems installed in each of the stations. Several of the sea level stations have replaced their measuring equipment, changing from measurements based on bottom pressure sensors to radar sensors. Two coastal buoys (Soller and PortoColom) have been incorporated into the observation system. However, funding has not been obtained until 2024 for the renovation of the buoys in the Bay of Palma and the Ibiza Channel.
1.1.4. Maintain the lagrangian platforms fleet	Achieved	This action aims to maintain an active fleet of Lagrangian platforms, consisting of 8 surface drifters (SVP/SVP-B) and 5 profilers, for continuous observation capability by deploying 8 new drifters and 3 profilers annually. Regarding the profiling float fleet exceeded the minimum requirements (by Disposición 14622 del BOE núm. 214 de 2022), although deployment targets were not fully met due to some technical challenges. New equipment purchases (2 profilers and 12 drifters) in 2024, ensuring the action's successful completion. The SOCIB Lagrangian platforms fleet report provides more details about the deployments.
1.1.5. Update and maintain HF Radar capabilities	Achieved	Regular daily, weekly, monthly, and bi-annual maintenance of the HFR system is performed by SOCIB, QUALITAS S.A, and the Ibiza front-end (subcontractor; Manel Sanchez Riera). Other maintenance tasks included: antenna inspection, cable cleaning, connector replacement, and transmitter check. Cabling faults were fixed, and further corrections planned for 2024. GALF's cabin door was replaced due to corrosion. Fire extinguishers installed at both sites, door installed for safer antenna access to Formentera's antenna. New UPS batteries, software upgraded to SeaSonde R22, Apple computers replaced with ARM processors and Ventura OS for better security and processing. Improved SSH and VNC access controls, port changes, and network security measures. Acquisition of AIS Auto-APM Software delayed pending evidence of usefulness; CODAR confirms it's for antenna monitoring, not a boat-supported APM replacement.
1.1.6. Update and maintain Beach Monitoring systems	Achieved	Field surveys have been carried out. The report is available: Sánchez-García E., Wirth, N., Soriano-González, J., Lizarán, i., Casas, B., Criado-Sudau, F. F., & Fernandez-Mora, A. (2024). Field Campaigns 2023 Annual Report (Version 1.0). Balearic Islands Coastal Observing and Forecasting System, SOCIB. https:/doi.org/10.25704/tthd-g942.

Action	Assessment	Comments/Justification (means of verification)
1.1.7. Update and maintain hydrodynamic modelling and prediction capabilities	Achieved	WMOP's operational capabilities are maintained with updates and a robust monitoring system (to detect system failures and to assess the latest data assimilated), enabling accurate predictions, reanalysis, and ensuring reliable oceanographic data for various stakeholders in the Balearic Islands and Western Mediterranean (WMOP Numerical Model Viewer on the corporate website).
1.1.8. Update and maintain "rissaga" modelling and prediction capabilities	Achieved	BRIFS' operational capabilities are maintained with an efficient monitoring system for helping to minimize downtime and ensure the continuity of operations (BRIFS Numerical Model Viewer on the corporate website).
1.1.9. Update and maintain wave modelling and prediction capabilities	Achieved	The update of the wave forecasting system was completed in 2021. The Wave forecasting system was successfully updated and migrated to a new computational machine, reducing computational time, implementing automated monitoring, and ensuring reliable 24-hour forecasts for the Balearic Islands SAPO Numerical Model Viewer on the corporate website.
Strategy 1.2. Expand and enhance observing and forecasting capabilities		
1.2.1. Extend new glider observation areas	Achieved	The new observational areas that we have done during the year 2021-2024 are available in this link. In terms of numbers: i) gliders available for New observational areas - 4 gliders; ii) Missions performed to new observed areas - 15, iii) days of gliders - 1102 glider days until 31/12/2024; iv) nautical miles flown - 13,325nm until 31/12/2024; v) CTD profiles -26,299 until 31/12/2024.
1.2.2. Improve and increase observational capabilities by measuring Essential Ocean Variables EOV's	Achieved	The addition of 'Dissolved Oxygen' and 'Chlorophyll' to the data catalog enhances observational capabilities by expanding biogeochemical monitoring. This aligns with the goal of improving EOV measurements through laboratory analysis, complementing the use of new sensors and tools (Public Access to Data related to New Variables included in the ICTS SOCIB Data Catalog).
1.2.3. Deploy infrastructure to provide Real-Time Wave data at the Beach Monitoring Stations	Not achieved	This action was subject to a competitive infrastructure call, but no applications were submitted.
1.2.4. Enhance HF Radar capabilities	Not achieved	This action was subject to a competitive call. SOCIB participated in 2 competitive calls (Convocatoria Adquisición Equipamiento Científico-Técnico Servicios Comunes 2021, Convocatoria ICTS 2022 del Plan de Recuperación y Resiliencia) for the acquisition of HF Radar infrastructure. Despite the efforts made and having achieved a score at the limit of those eligible for funding in both cases (8.91 for Ref. ICT2022-007870-2 and 84,89 for Ref. EQC2021-007752-P), unfortunately, funding was not secured. Additionally, in November 2023, SOCIB updated the software and hardware of its HF radar facility to ensure continued operation and monitoring capabilities in the Ibiza Channel. This upgrade aims to reduce system failure risk, prevent obsolescence, and enable maintenance and security updates, improving performance and adding new features to the system.
1.2.5. Develop ensemble forecasting capacities for the "rissaga" modelling and prediction capabilities	Achieved	SOCIB has significantly improved the Balearic RIssaga Forecasting System (BRIFS) by implementing a twice-daily run and providing uncertainty estimates through ensemble forecasting. This approach, supported by recent research (Mourre et al., 2021) enhances the accuracy and reliability of meteotsunami predictions in Ciutadella harbor.

Action	Assessment	Comments/Justification (means of verification)
1.2.6. Implement high resolution hydrodynamic models for prediction in coastal areas of the Balearic Islands	Achieved	High-resolution coastal simulations in CALYPSO allow for detailed analysis of vertical velocities in the Western Mediterranean, crucial for understanding ocean dynamics and informing coastal management. Findings have been disseminated through various channels (EGU 2021, publications, Final Technical Report on the Implementation and Evaluation of Sub-1 km Resolution Current Simulations in Specific Areas around the Balearic Islands).
Strategy 1.3. Increase the number of competitive accesses to ICTS SOCIB Unique Facilities: R/V SOCIB & Glider fleet		
1.3.1. Improve the Competitive Open Access plan: R/V SOCIB and Glider fleet	Achieved	Competitive Open Access Plan has been improved (Access to New Protocol for the SOCIB Glider Fleet on the corporate website; Open Access Glider Section on the corporate website). In terms of numbers: i) Total number of campaigns in competitive access to the Glider fleet - 22 glider missions; ii) Total number of navigation days in competitive access - 947.
1.3.2. Launch new calls for Competitive Open Access to the R/V SOCIB and Glider fleet	Achieved	Between 2 and 3 calls per year have been launched for glider competitive access as indicated in the table of talls historical record (Open Access Glider Section on the corporate website). In terms of numbers: i) calls - 8 calls (only Glider open access); ii) applications - 14 applicants.
1.3.3. Work towards good coordination between the CANALES SOCIB programme with the IEO RadMed programme	Not achieved	This action has not been completed. However, it is worth noting that, within the framework of the IEO RadMed Program, SOCIB has collaborated with ICM-CSIC and the IEO (News 14/07/2023: La temperatura y salinidad del Mediterráneo está aumentando en todas sus profundidades; Scientific paper: Observations in the Spanish Mediterranean Waters: A Review and Update of Results of 30-Year Monitoring:; Additionally, SOCIB signed an equipment sharing Agreement (L-ADCP RDI, Benthos deck unit) with the PI of the RADMED project in 2023.
1.3.4. Promote Transnational Access to ICTS SOCIB RI	Achieved	Transnational Access has been effectively promoted, resulting in 4 accesses and 4 users (Open Access Glider Section on the corporate website; JERICO SOCIB Transnational Access website).

Objective 2. Boost the visibility, accessibility and use of oceanographic data

Action	Assessment	Comments/Justification (means of verification)
Strategy 2.1. Improve an oceanographic data management programme: integrated and standardized data		
2.1.1. Implement an ICTS SOCIB's Data Management Programme	Not achieved	In 2023, SOCIB successfully developed the design of the structure and content of the Data Management Program, showcasing the essential structure intended to establish an adequate data management program for the ICTS SOCIB. However, due to a lack of staff following the departure of several Data Center team members and the difficulty to recruit new members, this Data Management Program has not been fully achieved.
2.1.2 Improve FAIRness of resources available in the ICTS SOCIB Catalogue	Achieved	The FAIRness of resources in the Data Catalog has been improved through several initiatives, such as the improvement of metadata for several variables and data products (access to ICTS SOCIB Data Policy).
2.1.3. Adopt new international Ocean Glider standard for ICTS SOCIB Glider Observation Programmes	Not achieved	The release and adoption of the OG1.0 format for gliders is still under discussion (IUGC June 2024 Data Management Workshop). While this action has not yet been fully achieved, significant progress has been made. The conversion process from NetCDF to OG1.0 is currently being explored and developed within the Blue Cloud 2026 project). Within this context, a document is being developed to define the format and metadata for the added value products, with the aim to be shared, discussed and agreed with the scientific community that it is expected to be publicly available at the end of the project under the title "BlueCloud: Advance product. Definition of format and metadata of added value products".

Action	Assessment	Comments/Justification (means of verification)
2.1.4 Distribute standardized near real-time and reprocessed HFR surface current data	Achieved	Standardized HFR data is distributed on the main European marine data portals (e.g. Copernicus Marine Service and EMODnet) throughout the European HFR Node (from which SOCIB is part, together with AZTI and CNR-ISMAR), but not on the ICTS SOCIB portal, where it is published in the SOCIB format. Additionally, SOCIB has developed the API for the European HFR Node and the API-HOORT 'HFR Outage Online Reporting Tool API', which are being used for third-party applications (HOORT, EU HFR Node map) and institutions for gathering HFR metadata (OceanOPS) .
2.1.5 Analyze the quality of the ICTS SOCIB lagrangian platforms data	Achieved	The report 'SOCIB Lagrangian Platforms Data and Metadata Assessment Report (2021-2024)' analyzes the quality of data collected by SOCIB's Lagrangian platforms, including surface and subsurface drifters and profiling floats, as part of the Strategic Plan 2021-2024. It outlines the data review process, focusing on Near Real-Time Quality Control (NRTQC) and post-deployment corrections. The report includes tables detailing the review status and correction needs for Lagrangian deployments from 2021 to 2024, aiming to assess the achievement of the key result of reviewing at least 50% of Lagrangian platform data annually, ensuring data accuracy and reliability.
Strategy 2.2. Obtain quality brands and trust seals in oceanographic data		
2.2.1. Obtain the CoreTrustSeal Certification	Achieved	SOCIB Data Repository obtained the CoreTrustSeal Certificacion (News 10/06/2022: Achieving FAIR Data: SOCIB Data Repository obtains the CoreTrustSeal Certification; CoreTrustSeal certified data repositories at CoreTrustSeal website).
2.2.2. Obtain accreditation as an I.C-IODE Associate Data Unit	Not achieved	SOCIB has successfully submitted the application to receive the accreditation as a Certified Associated Data Unit of the IOC/IODE (Application submitted in December 2024). However, it is still in the revision process and the accreditation has not been approved yet.
Strategy 2.3. Align ICTS SOCIB's data policy with the International Open Data and Open Science mandates		
2.3.1. Update the ICTS SOCIB Open Data policy and measures to enhance citation and recognition	Achieved	ICTS SOCIB Data Policy has been updated. The ICTS SOCIB Terms of Use have been established for two types of data access for users and institutions: Open Access and On Demand (Access to ICTS SOCIB Data Policy section on the corporate website; Access to ICTS SOCIB Terms of Use section on the corporate website; Access to SOCIB Data Catalog).
2.3.2. Implement an alignment plan with the international Open Science Mandates: Open Science/ Open Data/ Open Source	Achieved	The ICTS SOCIB has worked to consolidate an environment conducive to high-quality research and establishes good practices in Open Science, scientific integrity, equality, transparency, and good governance (Access to Open Science section on the corporate website).
2.3.3. Update and maintain the ICTS SOCIB's space in the DIGITAL.CSIC repository	Achieved	SOCIB has updated and maintained the ICTS SOCIB's space in the DIGITAL.CSIC repository. ICTS SOCIB's collection has 8 datasets (Access to SOCIB Datasets Collection on Digital.CSIC).
Strategy 2.4. Reinforce monitoring impact, traceability, and continuous evaluation of the usage of oceanographic data and other resources of ICTS SOCIB		
2.4.1. Improve the DOIs assignation policy for ICTS SOCIB's research resources through Data Cite and DIGITAL.CSIC.	Achieved	The SOCIB institutional repository provides a centralized and accessible platform to store, preserve, and disseminate the ICTS SOCIB's production, being a key tool for increasing visibility and impact (Access to SOCIB Institutional Repository): Fernández-Mora, À., Juza, M., Tintoré, J. (2021) - https://doi.org/10.25704/ra9h-5127; Fernandez-Mora et al., (2022) - https://doi.org/10.25704/AHJV-DA25; González-Villanueva et al., (2023) - https://doi.org/10.5281/zenodo.8056415; Soriano-González, et al., (2023)- https://doi.org/10.5281/zenodo.12698764; Soriano-González et al., (2024) - https://zenodo.org/records/10159978; Mourre et al., (2024) - https://doi.org/10.20350/digitalCSIC/16511; Díaz et al., (2024) - https://doi.org/10.25704/yb5v-yx90.

Action	Assessment	Comments/Justification (means of verification)
Strategy 2.5. Develop a Digital Strategy applying sustainable and smart solutions to oceanographic data		
2.5.1. Implement Machine Learning and Artificial Intelligence methods to analyse data	Achieved	The implementation of ML/AI techniques has mostly been done in the context of the iMAGINE project, with the publication of: i) two training image datasets (BWILD in Soriano-González et al., 2024 and SCLabels by Soriano-González et al, 2024); i) AI models for the detection of Posidonia oceanica berms and for the detection of rip currents. Furthermore, project outcomes have been disseminated in different conferences (e.g., Coast2Coast). Additional publications (e.g. Viaña-Borja et al., 2023) have been made in collaboration with CSIC-ICMAN. Additionally, two studies carried out during student internships have applied AI algorithms to the 'Detection and segmentation of Posidonia oceanica seagrass meadows in images' and to the "Coastal monitoring using artificial intelligence: shoreline detection" and SOCIB has participated in the proposal "DEPTH-AI - Exploring the Depths: AI-enhanced seabed mapping", coordinated by CSIC-ICMAN.
2.5.2. Implement the CoastSat model: Machine Learning for assessing coastline evolution	Achieved	The suitability of ML methods on the automatic detection of shorelines from satellite images is being developed by Bachelor and Master Degree students internships. Four student internships from Uguet (2022), Lozano (2021) and Bennàssar (2021) focused on the analysis of shoreline evolution in the Balearic Islands using the CoastSat model. In addition, in the context of FOCCUS project (task 2.3.1), the use of CoastSat, as well as SAET models is being analyzed for extracting satellite derived shorelines. The deliverable is for December 2024.
Strategy 2.6. Integrate and distribute ICTS SOCIB's oceanographic data		
2.6.1. Integrate and distribute all ICTS SOCIB data in Global, European and Spanish portals and repositories (Data Hubs), and in European project networks, including beach and model data-sets	Not achieved	A significant amount of SOCIB data have been continuously distributed in external portals. However, the amount of data distributed have not reached 100% (>32% of data distributed in 2023 and in 2024).
2.6.2. Publish DATA COLLECTION of the first BMF long-term dataset a Data Descriptor in Nature Scientific Data or similar	Achieved	A decade-long dataset of morphological and hydrodynamical data from Cala Millor Beach is now available for research and coastal management purposes. Data collection was published in Nature Scientific Data (Scientific paper: Ten years of morphodynamic data at a micro-tidal urban beach).

Objective 3. Promote social, economic, and environmental impacts through added-value ocean products and services

Action	Assessment	Comments/Justification (means of verification)
Strategy 3.1. Reinforce a Responsible Research and Innovation (RRI) Strategy		
3.1.1. Build a national and international multi- stakeholder and sector-specific engagement strategy	Achieved	IA national and international multi-stakeholder and sector-specific engagement strategy has been developed, fostering the design of inclusive and sustainable research and innovation through an effective transfer of knowledge across different strategic users and sectors (Access to Knowledge Transfer Strategy: Applications and Services of SOCIB (2023-2026) on the institutional repository).

Action	Assessment	Comments/Justification (means of verification)
Strategy 3.2. Promote the restructure of SIAS Division		
3.2.1. Restructure and boost the area of Strategic Issues and Applications for Society (SIAS Division) The new Environmental Management of Coastal and Marine Areas service (proposal)	Achieved	The new Corporate Strategy, Communication, and Knowledge Transfer Service has been established in SOCIB, enhancing the development of strategic services, products, and applications (Access to the presentation of the new Corporate Strategy, Communication, and Knowledge Transfer Service).
Strategy 3.3. Update ICTS SOCIB's oceanographic products and services		
3.3.1. Improve the high-resolution ocean forecasting models: SAPO (waves), BRIFS (rissagues), and WMOP (ocean currents)	Achieved	SAPO: Action achieved in 2021. Enhancement included an improvement of the efficiency (reducing computational time by 8 times), increased reliability (the automated monitoring system ensures proactive identification and resolution of system issues, minimizing downtime and data loss) and enhanced user value (providing reliable 24-hour forecasts for 95% of the year). BRIFS: SOCIB has upgraded the BRIFS system to run twice daily and include ensemble forecasting, leading to more accurate and reliable meteotsunami predictions in Ciutadella harbor (Mourre et al., 2021). WMOP: Action achieved in 2023 and updated in 2024 (report). One prototype with configuration and evaluation of current simulations with 650m resolution around the Balearic Islands has been performed in the context of the CALYPSO project. Findings have been disseminated in papers (García-Jove et al., 2023), seminars at IMEDEA, at SOCIB, during stakeholders annual meetings with SASEMAR.
3.3.2. Update the SACOSTA (Coastal Environmental Sensitivity Atlas of the Balearic Islands) viewer	Not achieved	This action has not been executed. After analyzing the update requirements and despite the tool's potential, its update is scheduled for the next period.
3.3.3. Develop Bluefin tuna larval survival indicators	Achieved	Indicators for assessing tuna larval survival have been created within initiatives like the BALEATUN and TUNAWAVE projects and the MedTunaHabitat Observatory (Álvarez-Berastegui, et al., 2023, Terms of Reference). Key outcomes have been disseminated in diverse peer- review publications (Díaz-Barroso et al., 2022, Álvarez-Berastegui et al., 2021, Tugores et al., 2021) as well as workshops and conferences (Álvarez-Berastegui, et al., 2023, Casaucao et al., 2022, Sánchez et al., 2022). Additionally, several news were published: Un nuevo estudio muestra cómo las características hidrodinámicas singulares del mar Balear favorecen la presencia de larvas de atún rojo 01/04/2022; La ICTS SOCIB y el IEO ponen en marcha el proyecto BaleAtún que contribuirá a la gestión sostenible del atún rojo en el mar Balear - 03/08/2022; La ICTS SOCIB y el IEO aúnan ecología y oceanografía operacional para lograr una gestión pesquera sostenible del atún 02/05/2021; 10 años de colaboración entre el IEO y la ICTS SOCIB para mejorar la gestión del atún rojo en el mar Balear 25-09-2021.
3.3.4. Improve the IBISAR service	Achieved	The IBISAR service was actively developed and improved to meet the needs of its target users (SASEMAR) until the end of the contract in March 2021. The final report (Reyes, 2021), submitted in July 2021, details the impact of the updates of datasets, the proposal for including additional high-resolution regional models to cover the Search and Rescue responsibility area in the north of Spain, and the maintenance operations. After the finalization of the contract, the management of the tool is handled by a third party (RPS Ocean Science) and the service is hosted in CSS-Jovellanos, the project's target user. Additionally, the final report includes the users' statistics of the service, the list of promotional activities as well as the end-user feedback. SOCIB continues strengthening the collaboration with the Maritime Safety and Rescue Society (SASEMAR) through annual meetings, participation in events and courses. Additionally, The WMOP model has been successfully integrated into SASEMAR's operational Environmental Data Server and its accuracy consistently proves valuable in real-world exercises, demonstrating its effectiveness in day-to-day operations.

Action	Assessment	Comments/Justification (means of verification)
3.3.5 Launch a Mediterranean Oceanographic Exploration Tool	Achieved	The Mediterranean Surface Exploration Tool has been launched, successfully providing valuable exploration tools and marine data to stakeholders (Access to the Mediterranean Surface Exploration Tool). This tool allows exploring various ocean variables providing information on the sea surface of the Western Mediterranean Sea. This application was also one of the tailored products and services developed for the EuroSea project. Status in 2024: model data are integrated operationally in the application while the satellite datasets require updates which could be successfully performed when human resources in the data center will be recovered. However, additional SOCIB applications are integrating operationally satellite data providing continuous and updated information (https://apps.socib.es/subregmed-indicators/, https://apps.socib.es/subregmed-marine-heatwaves/, https://apps.socib.es/observatoriotiamat/, https://apps.socib.es/satellite-imagery/).
Strategy 3.4. Develop new ICTS SOCIB's oceanographic products and services		
3.4.1. Design and implement a Products and Services Strategy Plan	Achieved	The Applications and Services Strategy for ICTS SOCIB has been developed, successfully addressing the needs of potential users and supporting effective ocean and coastal governance (Access to Knowledge Transfer Strategy: Applications and Services of SOCIB (2023-2026) on the institutional repository).
3.4.2. Foster glider visualization tool	Achieved	SOCIB contributes to the Blue Cloud 2026 Virtual Labs to enable the access, integration and exploitation of glider observations collected along the European coastal ocean areas (VLab #T3). Aligned with this purpose the format and metadata for the added value products have been defined. During the development of the Virtual Lab, the application of Sub-regional Mediterranean sea indicators provides valuable insights into ocean circulation and transport processes.
3.4.3. Develop ICTS SOCIB GISBeach 2.0	No achieved	This action has not been carried out. The GIS tool will be incorporated into the framework of the digital twin implementation, and this action may be addressed within that context.
3.4.4. Promote the Sub-regional Mediterranean Sea indicators Tool	Achieved	Continuous and updated information about ocean state and variability has been provided through the Sub-regional Mediterranean Sea Indicators Tool (access to the published scientific paper: Multivariate sub-regional ocean indicators in the Mediterranean Sea: from event detection to climate change estimations); Access to related news: SOCIB confirms the ocean warming persistence in the Mediterranean Sea in response to climate change through record trends observed over the period 1982-2021 (21/01/2022), The Western Mediterranean Sea reached record temperatures in 2022 (16/01/2023), and New ocean temperature record in 2023: Global warming continues impacting the Mediterranean Sea (31/02/2024).
3.4.5. Further the Sub-regional Mediterranean Marine Heat Waves Tool	Achieved	Continuous and updated information about marine heatwaves through the Sub-regional Mediterranean Marine Heat Waves Tool. The publication of three related scientific articles, and several news updates, have enhanced the understanding of climate change and its impacts (Access to the scientific papers: Sub-regional marine heat waves in the Mediterranean Sea from observations: long-term surface changes, sub-surface and coastal responses; Marine heat waves in the Mediterranean Sea: an assessment from the surface to the subsurface to meet national needs; Coastal ocean response during the unprecedented marine heat waves in the western Mediterranean in 2022; Access to related news: SOCIB confirms the ocean warming persistence in the Mediterranean Sea in response to climate change through record trends observed over the period 1982-2021 (21/01/2022), The Western Mediterranean Sea reached record temperatures in 2022 (16/01/2023) and and New ocean temperature record in 2023: Global warming continues impacting the Mediterranean Sea (31/02/2024)).
3.4.6. Promote Balearic Coast Evolution Indicators	Not achieved	This action has not been executed. While the GIS tool evaluation has not been conducted as a standalone task, it is currently being considered for inclusion within the broader scope of the digital twin ocean implementation, in which the coast evolution indicator can be included as an additional layer.

Action	Assessment	Comments/Justification (means of verification)
3.4.7. Restructure and enrich ICTS SOCIB satellite imagery	Achieved	The ICTS SOCIB satellite imagery has been improved and restructured providing enhanced, added-value information about the surface ocean state and its variability for scientific studies (Access to SOCIB Satellite Imagery tool). This tool has been enriched for the Fast-SWOT project, providing additional daily bulletin and climatology in the area of the dedicated oceanographic campaign (around the Balearic Islands). In addition, in the framework of the TIAMAT project, SOCIB has developed and implemented a new application "TIAMAT observatory" to monitor the marine systems of National Parks. Such tool integrated satellite data including high resolution images from Sentinel-2 (in collaboration with ICMAN-CSIC). Additional collaboration with ICMAN also resulted in a publication about semi-automated bathymetry using Sentinel-2 for coastal monitoring in the western Mediterranean. Also, in 2024, a position was opened (TC02-2024) to enrich the teledetection at SOCIB for a scientist specialist in teledetection for the observation of coastal and regional processes for the digital twins of the ocean. Finally, seagrass mapping is being developed in the framework of the FOCCUS project in collaboration with Brockmann Consult and CNR.
3.4.8. Develop a Run-up Early Warning System in Extreme wave conditions	Not achieved	Due to resource limitations, this action was not prioritized during the reporting period. However, there is interest from SOCIB, and some progress has been achieved within the framework of the iMAGINE project.
3.4.9. Develop "Costes Pel Canvi" outputs	Achieved	The ONA Toolbox (Operational tool for Climate chaNge impacts at locAl scales) has been developed, which effectively evaluates climate change impacts on the coastal and local scales in the Balearic Islands, thereby supporting effective climate governance (Access to ONA toolbox; access to related news: Una herramienta para evaluar los impactos del cambio climático a escala local: ONA Toolbox (22/11/2022). Presentations: ONA-Toolbox, operational tool to address climate change effects for coastal adaptation plans; ONA Toolbox: prototipo de gemelo digital para inundación costera y erosión de playas en Baleares; "What-ifs" of coastal flooding and erosion for a future regional DTO. Courses: Unit 4: Ocean&People "Lesson 4. Climate Change Effects in Coastal Areas and their Relevance on Adaptation Plans").

Objective 4. Support and promote excellence in marine and coastal research at the regional, national, and international levels

Action	Assessment	Comments/Justification (means of verification)
Strategy 3.1. Reinforce a Responsible Research and Innovation (RRI) Strategy		
4.1.1. Reinforce strategic collaborations in research and innovation at the regional and national level	Achieved	By participating in 10 national and 2 regional projects, having signed 9 national and 18 regional agreements, 15 data sharing agreements, 5 equipment sharing agreements, 6 general protocols, 4 educational agreements, 2 Memorandum of understanding at both regional and national levels, SOCIB has successfully strengthened and advanced strategic regional and national collaborations reinforcing research and innovation (Access the list of projects, agreements and technical assistance on the corporate website).
4.1.2. Strengthen strategic collaborations in research and innovation at the international level	Achieved	By participating in 16 European and 2 international projects, having signed 6 European agreements, 1 international data sharing agreement, and 2 Memorandum of Understanding at both international and European levels, SOCIB has successfully strengthened and advanced strategic international collaborations strengthening research and innovation (Access the list of projects, agreements and technical assistance on the corporate website).

Action	Assessment	Comments/Justification (means of verification)
4.1.3. Enhance private partnership	Achieved	Most of the European projects in which SOCIB has been involved have at least 1 partner (LIFEAdaptCalaMillor, EDITO-Model Lab, BC2026, GEORGE) from the private sector. SOCIB has also maintained 3 collaborations with private funding or private entities (Marine Traffic, BBVA Foundation, La Caixa Foundation), allowing the access to additional funding and/or promoting data sharing, successfully pursuing a global approach to ocean research and ocean observation (Access the list of projects, agreements and technical assistance on the corporate website).
Strategy 4.2. Promote ICTS SOCIB research lines in marine ecosystems, ocean health, ocean variability, and operational oceanography		
4.2.1. Study the role of retention and dispersal processes driven by mesoscale oceanography on the bluefin tuna (Thunnus thynnus) larvae ecology	Achieved	SOCIB has conducted research studies and delivered significant scientific production on the role of retention and dispersal processes driven by mesoscale oceanography on the bluefin tuna (Thunnus thynnus) larvae ecology. This achievement is evidenced by the publication of 5 scientific articles(Access to published scientific papers: Impact of individual early life traits in larval dispersal: A multispecies approach using backtracking models; Singularities of surface mixing activity in the Western Mediterranean influence bluefin tuna larval habitats; Impact of individual early life traits in larval dispersal: a multispecies approach using backtracking models; Bluefin tuna larval indices in the Balearic archipelago for the management strategy evaluation ("Strict Update" and "Revised Version" for 2001-2019 period); Assessing the spawning stock biomass of Albacore (Thunnus alalunga) in the western Mediterranean Sea from a non-linear larval index (2001-2019); Larval habitats and catches of swordfish (xiphias gladius) in the Balearic Islands (2001-2020): Oceanographic drivers and opportunities for research).
4.2.2. Tag sea turtles (Caretta caretta) and analyze trajectories	Achieved	SOCIB has conducted research studies and delivered significant scientific production on the tagging and trajectory analysis of sea turtles (Caretta caretta) by publishing a news, an article on National Geographic and a case study (Access to the news: Los datos de marcado de tortugas marinas de la ICTS SOCIB relevan sus principales amenazas en el mar -16/06/2021; access to National Geographic publication: Thunderbird: el peligroso viaje de una tortuga oceanógrafa; Access to the case study: Boyas y tortugas exploran las rutas del mediterráneo occidental).
4.2.3. Study the oceanographic conditions associated with jellyfish invasion in coastal area	Achieved	SOCIB has studied the oceanographic conditions associated with jellyfish invasion in coastal areas by maintaining and extending the jellyfish database and developing prediction tools for the Mediterranean Sea and the Balearic Islands. Results are compiled in two scientific papers (Access to scientific papers: Massive occurrence of the jellyfish Portuguese Man-of-War in the Mediterranean Sea: research to the rescue of coastal manager; Abundance of Pelagia noctiluca early life stages in the western Mediterranean Sea scales with surface chlorophyll). Annual meeting has been celebrated at SOCIB Headquarter where all members agreed to extend the agreement that will finalize on 16/10/2024. Additionally, the IP was invited to participate in the XXXII Jornada tècnica de seguretat en platges, giving a talk entitled "El estudio científico de medusas en el Archipiélago Balear. Herramientas implementadas y resultados obtenidos."
4.2.4. Study the relationship between water mass variability and red shrimps landings in the Balearic Islands	Achieved	SOCIB has studied the relationship between water mass variability and red shrimp landings in the Balearic Islands, successfully characterizing intermediate water mass variability in relation to red shrimp behavior and presence. The results are compiled in an internal report Adaptación al Cambio Climático: gestión sostenible de especies marinas y recursos de interés económico en el mar Balear. Additionally, a scientific paper addresses the long-term changes in the water mass properties in the Balearic Channels from 1996-2019 (Vargas-Yáñez et al., 2021).
4.2.5. Increase coupled physical-biogeochemical studies for the support of a healthy marine ecosystem	Achieved	SOCIB has strengthened collaboration in coupled physical-biogeochemical studies and understanding their implications on ecosystem variability, by publishing two scientific papers (Access to scientific papers Zarokanellos, and Jones, 2021 and Pastor et al., 2023).

Action	Assessment	Comments/Justification (means of verification)
4.2.6. Analyse and understand seasonal and interannual variability in the Mallorca and Ibiza Channels	Achieved	SOCIB has advanced in understanding the seasonal and interannual variability in the Mallorca and Ibiza Channels. The results are detailed in a scientific paper (Access to the scientific paper: Vargas-Yáñez et al., 2023).
4.2.7. Study three-dimensional current exchanges in meso- and submesoscale structures	Achieved	SOCIB has made significant progress in understanding three-dimensional current exchanges in meso- and submesoscale structures, comprehending 3D Lagrangian trajectories. This progress is documented in 7 scientific papers (Access to scientific papers: Frontal Dynamics in the Alboran Sea: 1. Coherent 3D; Pathways at the Almeria-Oran Front Using Underwater Glider Observations; Frontal Dynamics in the Alboran Sea: 2. Processes for Vertical Velocities Development; A Four-Dimensional Survey of the Almeria–Oran Front by Underwater Gliders: Tracers and Circulation; Conditions for Reliable Divergence Estimates from Drifter Triplets; Observing and Quantifying Ocean Flow Properties Using Drifters with Drogues at Different Depths; High-frequency radar-derived coastal upwelling index; Intense wind-driven coastal upwelling in the Balearic Islands in response to Storm Blas (November 2021).
4.2.8. Study the distribution of microplastics in the Mallorca and Ibiza Channels	Achieved	SOCIB has successfully assessed plastic waste distribution and seasonal variability in the Balearic Sea through research project proposal (PLASTICPRAD), workshops (Rubio et al., (2022) in EOF 2022), consultancy, and continuous microplastic sampling seasonal Canales cruises (FEB 2022, MAY 2022, JUL 2022, NOV 2022, FEB 2023, MAY 2023, NOV 2023, FEB 2024, MAY 2024, AUG 2024).
4.2.9. Study beach morphodynamics and resilience in front of global change and sea-level rise effects	Achieved	SOCIB has contributed to the current state-of-the-art knowledge on key near-shore morphodynamics, enhancing the understanding and prediction of coastal evolution in the context of global change and sea-level rise, by publishing scientific papers and conference communications (Coastal Flooding in the Balearic Islands During the Twenty-First Century Caused by Sea-Level Rise and Extreme Events, Sediment leakage on the beach and upper shoreface due to extreme storms, Semi-automated bathymetry using Sentinel-2 for coastal monitoring in the Western Mediterranean, Ten years of morphodynamic data at a micro-tidal urban beach: Cala Millor (Western Mediterranean Sea), Morphodynamic modelling of an embayed beach: role of the forcing, Storm deposits in a gravel and boulder pocket beach at the mouth of a karstic canyon (Torrent de Pareis, Mallorca), Sub-Regional Marine Heat Waves in the Mediterranean Sea From Observations: Long-Term Surface Changes, Sub-Surface and Coastal Responses). Additionally, this task has been carried out in the context of the following research projects: PIMA, LIFE, MOLLY, SOLDEMOR y Tech2Coast.
4.2.10. Assess marine traffic and ship-based activities	Achieved	SOCIB has made significant progress in assessing marine traffic and ship-based activities, conducting scientific analyses on its impact on marine ecosystems and publishing scientific papers (Access to the scientific paper: Tracking the global reduction of marine traffic during the COVID-19 pandemic).
4.2.11. Study physical carrying capacity	Achieved	SOCIB has developed tools for effective marine space planning and the preservation of marine ecosystems through the study of physical carrying capacity. These advancements are detailed in the scientific paper (Access to scientific paper: Mapping the nautical carrying capacity of anchoring areas of the Balearic Islands' coast. Presentations and reports: Estimación de la capacidad de carga náutica diaria y riesgo de saturación en zonas de fondeo; Análisis espacial de la capacidad de carga náutica de las zonas de fondeo de las Illes Balears; Memoria técnica: análisis espacial de la capacidad de carga náutica en las zonas de fondeo de la costa brava; Access to news: La ICTS SOCIB presenta el estudio de la capacidad de carga náutica del litoral balear.
4.2.12. Develop a strategic long-term vision of ocean integration	Achieved	4.2.12. Develop a strategic long-term vision of ocean integration Achieved SOCIB has successfully developed a strategic long-term vision of ocean integration, as evidenced by the publication of three key scientific papers (Access to scientific papers: Ocean Integration: The Needs and Challenges of Effective Coordination Within the Ocean Observing System; Corrigendum: OceanGliders: A Component of the Integrated GOOS; Western Mediterranean record-breaking storm Gloria: An integrated assessment based on models and observations).

Action	Assessment	Comments/Justification (means of verification)
Strategy 4.3. Promote the development and adoption of Ocean Best Practices (OBS)		
4.3.1. Implement ICTS SOCIB Ocean Best Practices	Achieved	SOCIB actively participated in Ocean Best Practices -OBP- workshops (IV, VII) and newsletters. It developed deliverables in the context of different projects (e.g. Jerico Next, Jerico S3, Jerico DS, EuroSea, EMODnet Chemistry) that are available in the OBPs repository (15 from 2021-2023 out of 53 total contributions). Those deliverables cover diverse topics including BPs of ocean observation and data management, focusing on multi-platform implementation, data quality control, particularly for gliders and high-frequency radars. Additionally, key findings have been published in scientific papers (Soriano-González, J., and Sánchez, E., 2024, El Serafy, G., et al., 2023) presented in several conferences (Martínez Ayala et al., 2023, Díaz Barroso et al., 2023, Strasser et al., 2023).
Strategy 4.4. Stimulate training of new generations of oceanographers and technicians		
4.4.1. Offer financial support to students in the last year of their bachelor's or master's degree	Achieved	SOCIB has supervised 4 Bachelor's Degree Final Project, 8 Master's thesis and 20 training internships, offering financial support to students in the last year of their bachelor's or master's degree (Access the Historical Research and Technical Record 2011-2023).
4.4.2. Increase the participation and leadership of ICTS SOCIB in Master's Degree		SOCIB has successfully expanded its involvement in university-related educational activities by increasing the participation and leadership of its personnel in Master's Degree programs. This progress is demonstrated by the establishment of educational cooperation agreements with the University of the Balearic Islands (UIB), the University of Cádiz (UCA) and the University of Jaume I (UJI).
4.4.3. Recruit young researchers and promote alliances/ agreements with other ICTS, groups, and national and international research centers		SOCIB has successfully increased training activities and institutional-related collaboration by recruiting young researchers and promoting alliances with other ICTS, groups, and national and international research centers. This is evidenced by the supervision of 2 ongoing doctoral theses, 8 Master's theses, 4 Bachelor's theses, and 20 curricular and extracurricular internships. Additionally, SOCIB has organized 9 courses, 45 workshops and seminars, and produced 9 teaching resources, significantly enhancing its educational and collaborative efforts (Access to the Historical Research and Technical Record 2011-2023).

Objective 5. Encourage society engagement and promote ocean literacy

Action	Assessment	Comments/Justification (means of verification)
Strategy 5.1. Foster Ocean Literacy, public recognition of ocean observatories and marine environmental education		
5.1.1. Design and implement a programme for the promotion of Ocean Literacy	Achieved	SOCIB has significantly enhanced local and regional Ocean Literacy through a comprehensive program that includes the production of 18 videos, 8 podcasts, 16 teaching resources, and 3 infographics, alongside participation in 54 seminars, 5 round tables, 7 open days, and 14 itinerant exhibitions. These efforts have strengthened the connection between ocean science and society (Access to the Programme for the promotion of Ocean Literacy).
5.1.2. Actively participate in the European Ocean Coalition (EU4Ocean)	Achieved	SOCIB has actively supported EU4Ocean aims locally, regionally, and internationally through its dedicated participation in the European Ocean Coalition (EU4Ocean) (Access to EU4Ocean website project).
5.1.3. Submit the "Acostamar. Más ciencia para conservar el mar Balear" towards FECYT call	Achieved	SOCIB has tried to foster ocean-related education and awareness, and promoted ocean literacy at both regional and national levels by submitting the project 'Acostamar. Más Ciencia para Conservar el Mar Balear' to the 2020 FECYT call.

Action	Assessment	Comments/Justification (means of verification)
5.1.4. Participate in international networks of Ocean Literacy experts	Achieved	SOCIB has successfully fostered ocean-related education and awareness by actively promoting Ocean Literacy at both European and international levels. This has been accomplished through meaningful participation in established networks of Ocean Literacy experts. Key contributions include involvement in the 'Scientists for Ocean Literacy' project, under the auspices of the Decade Programme Ocean Literacy With All (OLWA), and active engagement in World Oceans Day 2021, organized by the EU4Ocean Coalition for Ocean Literacy. Additionally, SOCIB has contributed to Ocean Observers, facilitating the sharing of international marine science educational resources, as well as to the European Marine Science Educators' Association (EMSEA). These efforts have further solidified SOCIB's role in promoting collaboration and knowledge exchange among Ocean Literacy stakeholders.Moreover, SOCIB contributed to the report 'Ocean Literacy in European Oceanographic Agencies: EuroGOOS Recommendations for the UN Decade of Ocean Science for Sustainable Development 2021-2030', These initiatives underscore SOCIB's unwavering commitment to fostering global Ocean Literacy, aligning with international efforts to support sustainable ocean stewardship.
5.1.5. Organise workshops for education professionals: "The sea as an educational resource"	Achieved	SOCIB has successfully fostered ocean-related education through its participation in workshops for education professionals. This is demonstrated by our active involvement in sector-specific meetings with teachers as part of the LIFEAdaptCalaMillor project, our engagement in teacher-focused workshops, and the signing of an agreement with Seateach. These efforts underscore our commitment to integrating ocean education into teaching practices (Access to tweet regarding our participation in workshops, and to the agreement).
5.1.6. Host the second Ocean Observers virtual workshop	Achieved	SOCIB has successfully established new international collaborative activities in marine education by hosting the second Ocean Observers virtual workshop (Access to 2nd Ocean Observers Workshop Final Report and EA-RISE D7.8).
5.1.7. Conceptualize and produce "The Balearic Sea Seven Principles of Ocean Literacy" video	Achieved	SOCIB has successfully promoted Ocean Literacy at local and regional levels by conceptualizing and producing the video 'The Balearic Sea Seven Principles of Ocean Literacy.' This initiative effectively communicates key ocean literacy principles to the public, enhancing understanding and engagement with marine science (Access to the video).
5.1.8. Design and promote the "Bluefin Tuna, Operational Oceanography and Ecology" video	Achieved	SOCIB has effectively increased awareness of the importance of science with and for society by designing and promoting the video 'Bluefin Tuna, Operational Oceanography, and Ecology.' This effort is demonstrated by the availability of the video titled "La Ciencia y el Atún Rojo: Ecología, Oceanografía y Conservación".
5.1.9. Promote the Nomination of World Mediterranean Day (IOC-UNESCO)	Achieved	Although the nomination of World Mediterranean Day was ultimately led by another institution and established for November 28th, the active collaboration between SOCIB and the Union for the Mediterranean, including the formalization of alliances, the organization of events, and the visibility campaign, has successfully achieved the objective of fostering Mediterranean-related awareness (Access to the web; Access to the dedicated web at SOCIB in 2024).
5.1.10. Create and share a Science-Based Beach, Coastal and Sea Code for the Balearic Islands Guide	Achieved	SOCIB has successfully increased awareness of the need to respect and protect the environment by creating and sharing an educational guide, along with a storybook, that addresses the impacts of climate change and potential solutions in a comprehensible and engaging manner for primary and secondary school students (Access to the guide; access to the storybook).
Strategy 5.2. Enhance participation in Citizen Science projects		
5.2.1. Coordinate the Microplastic Watchers - "Observadores del Mar" project in the Balearic Islands	Not achieved	Neither human nor financial resources have been available. Luis Francisco Orejón, the project manager, left the position on 31/12/2020.

Action	Assessment	Comments/Justification (means of verification)
5.2.2. Create an ICTS SOCIB outreach catalogue	Achieved	SOCIB has contributed to creating a benchmark marine citizen science platform in Spain by participating in the 'Observadores del Mar' coordinator team. This involvement is evidenced by the signed agreement, which formalizes SOCIB's role in advancing this important citizen science initiative (Access to the agreement).
5.2.3. Design, create and publish an ICTS SOCIB Newsletter	Achieved	SOCIB has successfully generated social awareness about global change and sea-level rise effects on the coast through the launch of the CoastSnap citizen science initiative. This is demonstrated by the establishment of two CoastSnap stations in the Balearic Islands, which actively engage the public in monitoring and understanding coastal changes (Access to SOCIB CoastSnap Balears stations: S'Amarador and Arenal d'en Tem; Access to the news 21/07/2022 La ICTS SOCIB instala el primer sistema 'CoastSnap Balears' de ciencia ciudadana para el seguimiento de playas en S'Amarador, en el Parque Natural de Mondragó - 21/07/2022). Additionally, SOCIB is partner of the Citizen Science project 'Centinellas de la Costa', coordinated by Universidad de Vigo, and in collaboration with Universidad de Cadiz and ICM-CSIC (Access to the report of activities). 3 related scientific papers and 1 dataset have been published: https://doi.org/10.5194/essd-15-4613-2023; https://dx.doi.org/10.15304/9788419155832, https://doi.org/10.1016/j.ocecoaman.2024.107280; https://zenodo.org/records/10159978. Different BSc and MSc Thesis have been carried out: Low-cost/High-efficiency monitoring of coastal flooding and erosion: an application on the Sturla Beach; Coastal Monitoring Using Artificial Intelligence: Shoreline Detection).
Strategy 5.3. Grow brand awareness, find and engage the target audience		
5.3.1. Design and implement a social media marketing strategy	Achieved	SOCIB has successfully delivered targeted science communication by designing and implementing a social media marketing strategy. This is evidenced by the development of a comprehensive digital marketing plan applied to the website and social media platforms, enhancing the reach and impact of our science communication efforts (Access to SOCIB Communication and Digital Strategy Plan 2024).
5.3.2. Create an ICTS SOCIB outreach catalogue	Achieved	SOCIB has successfully transformed the way society perceives our seas by creating an outreach catalogue with 112 resources: 12 teaching units, 2 catalogues, 4 games, 1 app, 46 videos, 4 coloring pages, 17 infographics, 8 podcasts, 1 story, 5 websites, 5 brochures, 2 exhibitions, 5 other resources. This effort is demonstrated by the development of a collection of educational resources, which reorients education towards environmental principles and enhances public understanding of marine issues (Access to the SOCIB outreach catalogue).
5.3.3. Design, create and publish an ICTS SOCIB Newsletter	Achieved	SOCIB has effectively improved awareness about the science and related activities undertaken at ICTS SOCIB by designing, creating, and publishing a newsletter. This publication serves as a key tool for communicating our research, initiatives, and updates to the public, thereby enhancing overall awareness of our work (Access to the newsletters: November 2024 newsletter; December 2024 newsletter).

Objetive 6. Improve and strengthen the functioning and organizational structure of ICTS SOCIB

Action	Assessment	Comments/Justification (means of verification)
Strategy 6.1. Renew the structure, organizational chart, and internal functioning of ICTS SOCIB		
6.1.1. Initiate the process for renewal ICTS SOCIB organizational structure and chart	Achieved	SOCIB successfully initiated and completed the renewal process for its organizational structure and chart. This initiative aligned internal capabilities with evolving external demands, resulting in a new organizational chart that strategically supports SOCIB's mission. As part of this restructuring, new area and service heads were appointed to strengthen leadership across key functions (access to the following job offers: head of scientific area, head of technological area, head of communication and cooperative strategy service). Additionally, a Steering Committee (access to Steering Committee members) and a Plan Monitoring Commission (access to Plan Monitoring Commission) were established to oversee the implementation of strategic objectives and ensure accountability. These updates collectively reinforce SOCIB's capacity to respond to future challenges and opportunities, and are reflected in the new organizational chart.

Action	Assessment	Comments/Justification (means of verification)
Strategy 6.2. Develop and implement strategic human resources planning		
6.2.1. Promote measures to recruit and retain the talent, and provide continuous training for employees	Achieved	SOCIB has actively advanced measures to attract, retain, and develop talent within the organization, with a focus on fostering a skilled and engaged workforce. Key initiatives include the implementation of a comprehensive Human Resources Plan that outlines strategies for effective recruitment and retention, as well as a dedicated Training Program designed to support continuous learning and professional growth for all employees. These efforts aim to ensure that SOCIB maintains a high level of expertise and adaptability to meet current and future challenges. (Access to SOCIB training personnel programme).
6.2.2. Develop and implement a Gender Equality and Diversity Plan	Achieved	SOCIB has successfully developed and implemented a Gender Equality Plan, achieving the expected results of translating national equality legislation into effective actions to address gender imbalances. This plan also integrates the gender dimension more effectively into R&D and innovation programs and projects, thereby enhancing overall gender equality within the organization (Access to Gender Equality in the Plan Transparency Portal).
6.2.3. Improve adherence to corporate policies	Achieved	SOCIB has successfully improved adherence to corporate policies by ensuring compliance with established policies and procedures. This is demonstrated by the development of a comprehensive welcome manual and an onboarding protocol, which facilitate better understanding and implementation of organizational policies among new and existing staff (Access to Internal Procedure Manual 2023 factsheet).
6.2.4. Deliver the right tools to aid employees	Achieved	SOCIB has successfully delivered the right tools to aid employees in working better, smarter, and more collaboratively. This is evidenced by the creation of an Institutional Document Repository, the implementation of a pilot task management system for teams, the implementation of a time-tracking system, and the hiring of HR personnel to support staff needs and enhance overall productivity (Access to Institutional Repository, to task management, to time-tracking system, to HR personnel job offer).
6.2.5. Provide OKR methodology, task management tools and training for the staff	Achieved	SOCIB has effectively provided OKR methodology, task management tools, and training for staff, achieving the expected result of understanding employees' training needs and implementing a comprehensive training program. This is demonstrated by the hiring of a QRM Institute specialist, conducting training courses for personnel in agile organizations, the completion of the Master in Business Agility, and the hiring of a Scientist for Agile Coordination (Access to Master's Thesis).
Strategy 6.3. Strengthen the ICTS SOCIB brand identity		
6.3.1. Launch, communicate and position the new ICTS SOCIB website	Achieved	SOCIB has successfully launched, communicated, and positioned the new ICTS SOCIB website, achieving the expected result of designing and launching a web style manual, a catalogue of graphic and audiovisual resources, a web video tutorial, and a comprehensive communication plan. This effort is evidenced by the implementation of the new website (Access to the new website www.socib.es).
6.3.2. Improve internal and external communication: "ICTS SOCIB Communication Guide 2021-2024"	Achieved	SOCIB has successfully improved internal and external communication by developing the 'SOCIB Communication Guide to Society and the Media'. This guide serves as an effective tool for enhancing communication with both internal staff and external stakeholders (Access to ICTS SOCIB Communication Guide to Society and the Media).
6.3.3. Update ICTS SOCIB corporate identity (Brand style)	Achieved	SOCIB has successfully updated its corporate identity, achieving the expected result of improving public awareness through new, updated corporate materials. This is evidenced by the creation of a Corporate Identity Manual (used from 2022), a Annual Reports, a Style Guide, institutional videos, and brochures (Access to SOCIB Visual Identity Guide, to SOCIB Style Guide).

Action	Assessment	Comments/Justification (means of verification)
Strategy 6.4. Break-ground the new ICTS SOCIB headquarters: open up to Balearic Islands society		
6.4.1. The new ICTS SOCIB building: construction, equipment, moving and social presentation	Achieved	SOCIB has made significant progress in establishing its new headquarters, with the expected result of a state-of-the-art facility encompassing 3,600 m² across four floors, featuring 10 different laboratories, warehouses, and other essential spaces, and accommodating up to 100 permanent staff. This progress was presented through the ceremonial laying of the foundation stone, which signifies the commencement of construction. Currently, and with a view to early 2025, the planning of furniture and equipment is being organized (Access to Clipping of Laying the First Stone for the New ICTS SOCIB Headquarters).
6.4.2. Work on "ICTS SOCIB 2030-Polo Marino roadmap"	Achieved	SOCIB has successfully developed the 'ICTS SOCIB 2030-Polo Marino Roadmap,' achieving the expected result of setting an agenda and roadmap to maximize the impacts and resources of the new headquarters. The document outlines the implementation of the Dissemination and Knowledge Transfer Strategy at SOCIB's new headquarters, aligning with SOCIB's 2021-2024 Strategic Plan, with the objective of maximizing the impact and resources of the new site by enhancing SOCIB's connection with the community through scientific outreach, knowledge transfer, and cooperation, particularly leveraging its strategic location in Palma's Port (Access to the ICTS SOCIB 2030-Polo Marino roadmap).

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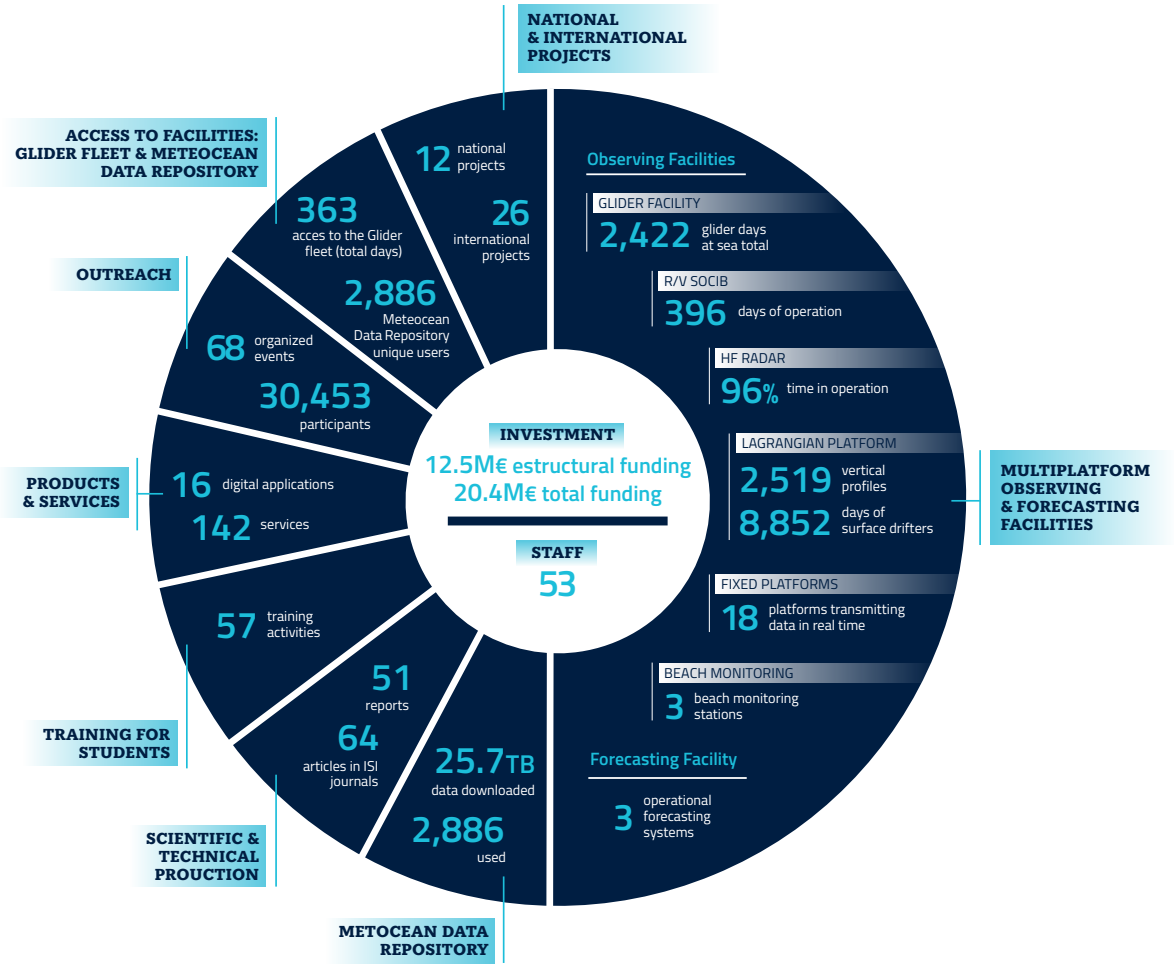
ANNEX III. SOCIB IN FIGURES 2021-2024

The following figure showcases SOCIB's remarkable performance through key figures for the 2021-2024 period. These numbers reflect our commitment to excellence, innovation, and sustainability in oceanographic research, reaffirming SOCIB as a leading institution in the field.

SOCIB numbers 2021-2024



The following figure presents key figures that illustrate SOCIB's operational excellence in observing and forecasting systems during the 2021-2024 period. These results highlight our continuous efforts to enhance ocean monitoring and prediction capabilities, ensuring high-quality data for scientific research and decision-making.

SOCIB Observing and Forecasting Facilities 2021-2024

Observing Facilities

GLIDER

64 missions
2,422 days at sea
79,575 CTD profiles

R/V SOCIB

72 oceanographic campaigns
396 days at sea

HF RADAR

96% time in operation (1,399 days)
83,2% area coverage

LAGRANGIAN PLATFORMS

PROFILERS
2,519 Vertical profiles
12,014 days of profilers observations

SURFACE DRIFTERS
13 surface drifters
8,852 days of surface drifters

FIXED PLATFORMS

18 platforms transmitting data in real time

6 sea level stations
3 oceanographic buoys
5 coastal stations
4 Weather stations

9 AIS antennas

BEACH MONITORING

3 beach monitoring stations
1,460 operative days
56 scientific field campaigns
5.38TB data downloaded

Forecasting Facilities

3 operational forecasting systems

OCEAN CURRENTS

1 high-resolution prediction system (WMOP)

WAVES

1 high-resolution prediction system (SAPO-IB)

RISSAGUES

1 atmosphere-ocean prediction system for meteo-tsunamis (BRIFS)

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ANNEX IV. PARTICIPATORY PROCESS FOR THE DEVELOPMENT OF THE SOCIB STRATEGIC PLAN 2025-2028

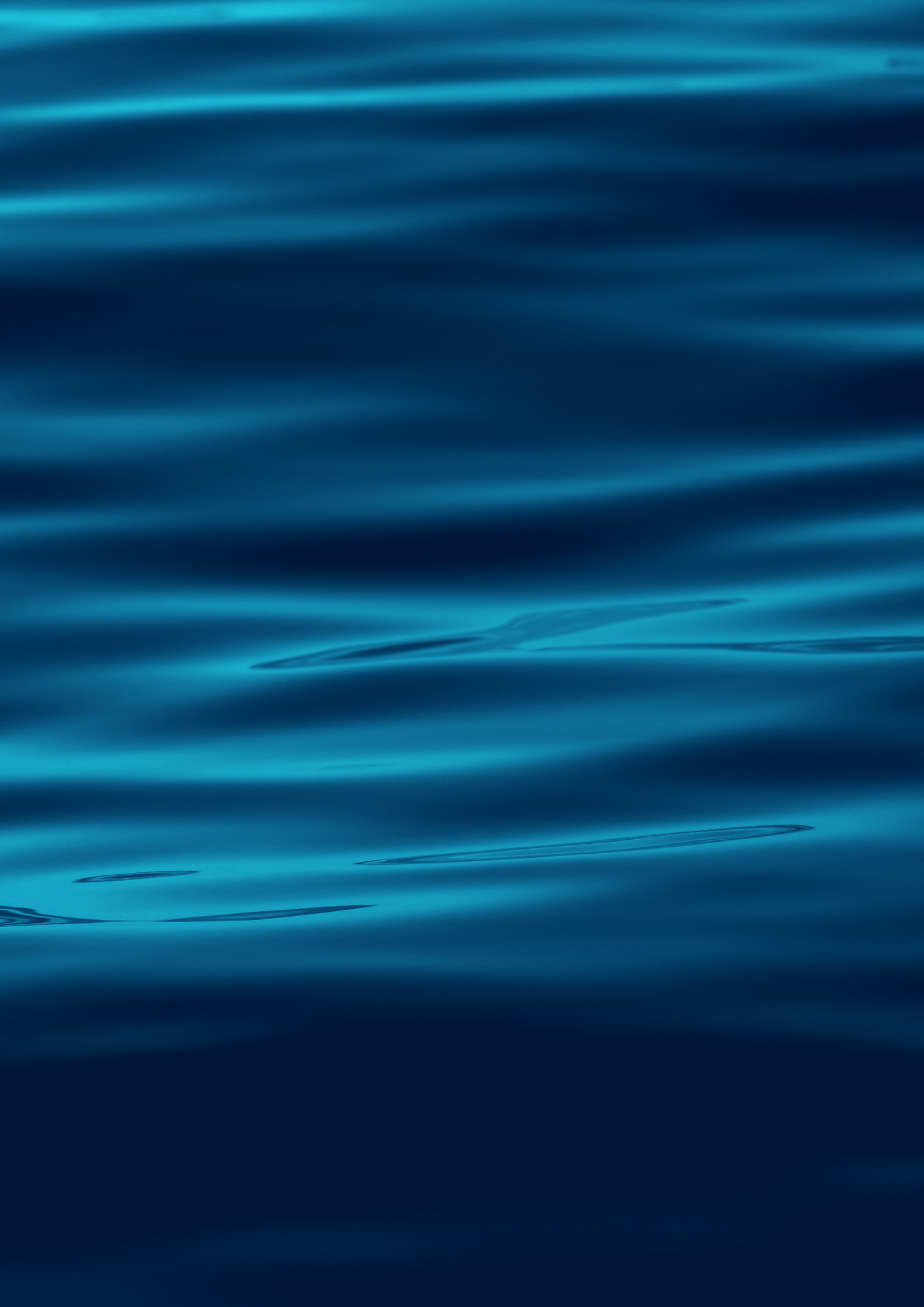
This annex presents the **participatory process** designed for the development of the **SOCIB Strategic Plan 2025-2028**, ensuring a **structured and inclusive approach** that has actively engaged the entire SOCIB community. This process builds upon the **participatory framework established during the previous Strategic Plan (2021-2024)**, incorporating **improvements in communication channels, consultation mechanisms, and collaborative decision-making**.

For more information, the following resources are available:

> **Participatory Process Document:** Explains the **methodology, phases, and participation mechanisms** used, detailing how SOCIB staff contributed to the development of the **Strategic Plan 2025-2028**.

> **Participatory Process Webpage:** A dedicated platform designed to **facilitate participation**, providing **real-time access** to information, surveys, and updates throughout the process. Available at:

This approach has ensured **transparency and inclusivity**, allowing the **SOCIB Strategic Plan 2025-2028** to reflect the **perspectives and contributions of its community**.



SOCIB

Balearic Islands
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Researching the sea, sharing the future

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