EUROPEAN UNION

EU MISSIONS
RESTORE OUR OCEAN AND WATERS

Overview of **European Research Infrastructures** in the marine domain

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Strengthening the EU Blue Parks Community
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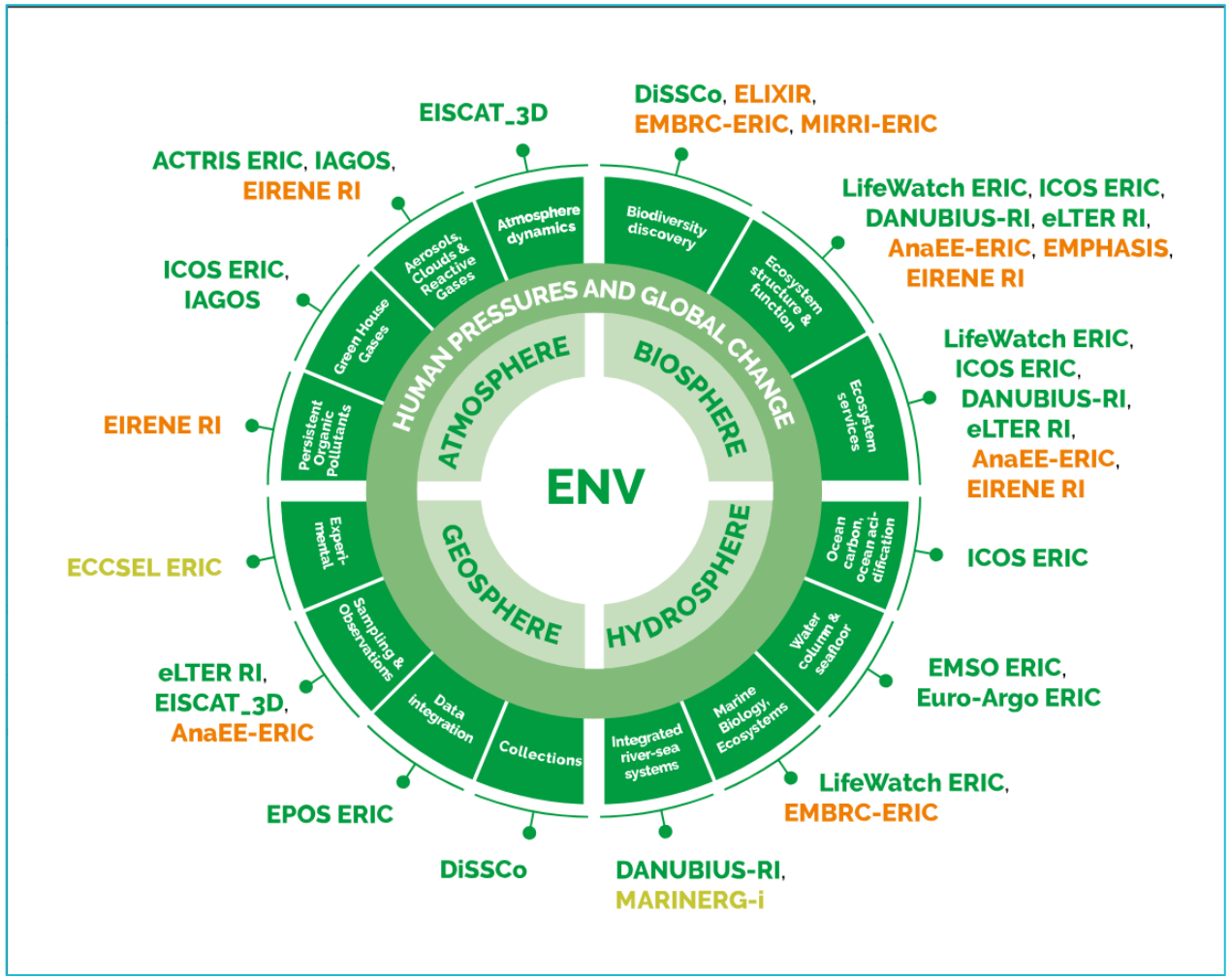
European landscape of research infrastructures (RIs)



Example: Landscape of the Environment domain (ESFRI Landscape analysis 2024)

- In 2000s: **National RIs + few IOs such as CERN, ESO, EMBL.**

European Research Area in 2024:

- **Pan-European RIs** - **ESFRI** Roadmap as incubator and a new legal framework, European Research Infrastructure Consortium '**ERIC**' as support for implementation
- **European RI networks** – set up through past EU research programmes (joint research activities, networking, access provision) opening up national RIs and promoting **common access programmes.**

  H2020 – **90 networks**, 37.000 researchers supported, open to international members and users
- **National facilities and labs** – large and small scale, national roadmaps (alignment of methodologies and priorities), often nodes of European RIs, national + EU funding (capacity building)

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*ESFRI** research infrastructures in the marine domain

ENVIRONMENT / DISTRIBUTED

EMSO ERIC

European Multidisciplinary Seafloor and water-column Observatory

ENVIRONMENT / DISTRIBUTED

EURO-ARGO ERIC

European contribution to the international Argo Programme

ENVIRONMENT / DISTRIBUTED

DANUBIUS-RI

International Centre for Advanced Studies on River-Sea System

ENVIRONMENT / DISTRIBUTED

ICOS ERIC

Integrated Carbon Observation System

ENVIRONMENT / DISTRIBUTED

LifeWatch ERIC

e-Infrastructure for Biodiversity and Ecosystem Research

HEALTH & FOOD / DISTRIBUTED

EMBRC ERIC

European Marine Biological Resource Centre

ENERGY / DISTRIBUTED

MARINERG-i

Marine Renewable Energy Research Infrastructure

ENERGY / DISTRIBUTED

ECCSEL ERIC

European Carbon Dioxide Capture and Storage Laboratory Infrastructure

ESFRI RI portfolio – 2024 first edition ri-portfolio.esfri.eu/ri-portfolio/

**European Strategy Forum on Research Infrastructures*

European Commission

ESFRI

HEALTH & FOOD / DISTRIBUTED

EMBRC ERIC

European Marine Biological Resource Centre

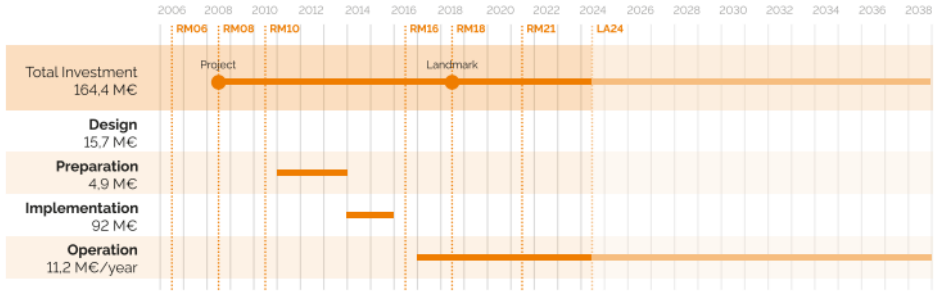
EMBRC
EUROPEAN MARINE BIOLOGICAL RESOURCE CENTRE

Website	Headquarters	Legal Status	Type	Access
https://www.embrc.eu	EMBRC ERIC Paris, France	Established (ERIC, AISBL, GmbH, Others)	distributed	remote, physical

DESCRIPTION

The European Marine Biological Research Centre (EMBRC-ERIC) is a pan-European research infrastructure created to support fundamental and applied marine biology and ecology research in Europe and beyond. Through our network of marine stations and sites (more than 70) across Europe (Belgium, France, Greece, Israel, Italy, Finland, Norway, Portugal, Spain, and Sweden), we provide access to marine biodiversity and ecosystems from Arctic to tropics, services, facilities, and resources to help researchers from academia and industry explore the ocean and develop innovative solutions to issues. Our broad community aims to accelerate knowledge-sharing and cutting-edge science to foster excellence in marine research. With the goal of advancing marine science across the globe, EMBRC covers different research fields, including environmental science, taxonomy, ecology, physiology, evolution and development, ecotoxicology and climate change impacts. We collaborate with partners to promote the sustainable use of marine resources, and foster scientific innovation for goods and services of the Blue Economy. Supporting education since its creation, EMBRC promotes training aims to foster new training initiatives in marine science for the current and next generation of 'blue workers', through its Marine Training platform. Our work to advance marine science is underpinned by our commitment to meet the UN's Sustainable Development Goals (SDGs) and tackle societal problems. In the face of pressing environmental issues, EMBRC contributes to the European efforts in understanding marine biodiversity and ecosystems, and the global science-based decision-making process. EMBRC has created EMO BON (European Marine Omics Biodiversity Observation Network) in 2021, a long-term marine biodiversity observatory that harnesses the potential of genomic methods to help understand the role of ocean life in the environment and their response to stressors. By connecting independent marine stations, EMO BON brings together decades of marine biodiversity knowledge and experience under one global network of observatories in Europe. This initiative is endorsed by the UN Ocean Decade of Ocean Science for Sustainable Development through the Ocean Biomolecular Observing Network (OBON) program, and aims to advance global discussions on marine observation to further develop ocean observation and monitoring capabilities. EMBRC has been part of the ESFRI Roadmap (European Strategic Forum for Research Infrastructures) since 2008 and was granted the status of European Research Infrastructure Consortium (ERIC) by the European Commission in 2018. It is part of the Food and Health RI community and collaborates with the Environmental RIs too, through the ENVRI community, to enable multidisciplinary science and boost collaboration in research. EMBRC headquarters are based in Paris and act as a central hub bringing together 10 member countries in Europe. It is registered as an international non-profit association under French law.

TIMELINE & ESTIMATED COSTS



POLITICAL SUPPORT

Lead
FR

Member
BE, ES, GR, IL, IT, NO, PT, SE

Prospective member
FI, SI

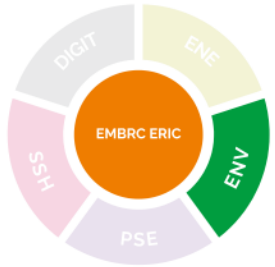
IMPACTS

EMBRC tackles societal challenges on multiple fronts: by contributing to the understanding and monitoring of marine ecosystems, by unlocking the potential of marine life for human health, and by promoting sustainable practices in marine biology and aquaculture. Through its dedicated marine biodiversity observatory network (EMO BON), EMBRC is pushing the inclusion of biological data in marine observation, particularly using DNA-based approaches, expanding our understanding of marine ecosystems, allowing an established and coherent framework for the monitoring of ocean health at European scale, crucial for assessing the status of our oceans, developing effective strategies to combat pollution and ensure sustainable fishing practices. EMBRC fosters research and innovation in aquaculture, addressing the challenges of environmental sustainability in this sector. With the objective to ensure food security and access to new sources of nutrients in Europe, EMBRC contributes to establish sound practices and protocols for the optimization of breeding programs and enhancement of disease resistance in marine organisms. By giving access to organisms in culture collections and marine model organisms, EMBRC offers a resource for bio-discovery across various fields (cosmeceuticals, pharmaceuticals, and nutraceuticals) and a biological platform for the study of genetic and molecular mechanisms underlying cancer and other diseases. Furthermore, EMBRC works to equip the next generation of marine scientists with skills and expertise in the use of state-of-the-art facilities and Open Science standards, through the access to different modalities of training (face-to-face, online, blended) to ensure the onset of professionals working for a healthy and productive ocean for generations to come.

SERVICES

EMBRC offers access to a broad range of facilities and living resources for research on marine ecosystems, macro- and microorganisms. Services are focussed on access to marine ecosystems (coastal research vessels, scientific diving teams) and marine organisms and their biodiversity, covering wild-type organisms (sampled on requests), culture collections of a wide selection of microorganisms (including genetically modified strains), and marine model organisms grown in the lab with full control of the life cycle. EMBRC also offers access to modular experimental facilities (aquaria, tanks, and mesocosms) enabling a broad range of experimental setups in proximity to the source of the organism and benefit from fully equipped laboratories and technology platforms for imaging, molecular biology and -omics, bioassays, structural and chemical analysis. Users can access these services either by on-site access (i.e. visiting our sites and their facilities) or by remote access (i.e. through shipment of the requested biological resources or analysed samples to their institutions). The collection and analysis of data is supported by e-services such as data analysis tools, bioinformatics and data management services. In 2021, EMBRC started to provide access to biodiversity genomics data obtained in its flagship initiative "European Marine Omics Biodiversity Observation Network" (EMO BON). EMBRC facilitates as well access to marine-related training opportunities and supports the education of the next generation of marine biologists and researchers through two digital platforms: MarineTraining (marinetraining.eu, a searchable catalogue of training courses and internships) and Ocean Training (oceantraining.eu, an e-learning platform for online and blended courses). Requests to access EMBRC services can be submitted online through the service catalogue in our website or by email to access@embrc.eu.

INTERCONNECTIONS



COOPERATION WITH OTHER RIS

As the only research infrastructure working in marine biology, EMBRC collaborates with other Research Infrastructures to build complementarities and to utilise the landscape of expertise in diverse scientific domains (from life sciences, through human health, to environmental sciences) to their fullest. Together with the RIs of the ENVRI community, EMBRC works to position research infrastructures as pillars for the support and sustainability of marine observation, collaborating for the development of methodologies (JERICO, Euro-ARGO) and tools for the analysis of marine biodiversity (LifeWatch) and for integrating these data in the European digital ecosystem (ELIXIR). EMBRC collaborates with other RIs in several projects for: the development of new imaging tools and methods (e.g. X-ray imaging and cryo-EM) to study marine ecosystems and its biodiversity, at cellular, ultrastructural and molecular level (EuroBioImaging, INSTRUCT, ESRF EBS); the harmonisation of practices and data from culture collections (MIRRI) by implementing the standards of the Access and Benefit Sharing framework, the establishment of sound aquaculture practices and reduced environmental impact (ANAEE); the bioprospection of marine products for human and environmental health (EU-OPENSCREEN) and for other biotechnological purposes (IBISBA). Furthermore, EMBRC has signed collaboration agreements and memoranda of understanding with different networks and organization for promoting the use of its services (EMBL, EOOS, EuroMarine), organising training events (EuroMarine, EMBL) and outreach activities (EMBL), and for the evaluation of the impact of its research outcomes (OpenAIRE).

RIs, website, references	Structure	Vision	Mission	Purpose
EMSO ERIC European Multidisciplinary Seafloor and water column Observatory www.emso.eu Favali et al., 2015	Fixed-point observatories in 14 key sites around European seas (Arctic, Atlantic, Mediterranean and Black Sea) for high-quality time series data on climate change, marine ecosystems and marine hazards	To become a world leader in Marine Environmental Sciences and Technology, from seafloor up to the surface	To establish a comprehensive and intelligent sensor system in water column, seafloor, and sub-seafloor environments as part of an integrated, sustainable and distributed organisation that provides high quality data, information, and knowledge	To illuminate major environmental processes to understand the complex interactions among the geosphere, biosphere, hydrosphere and atmosphere.
EURO-ARGO ERIC European contribution to the International Argo programme www.euro-argo.eu Roemmich et al., 2019	Maintain a quarter of the 4,700 profiling floats of the Argo international program	To revolutionised the European capacity of observing the interior of the ocean from the surface to the abyss inspiring the science we need for a sustainable ocean and contributing to society's wellbeing and resilience	Develop a long-term, sustainable European contribution to the OneArgo global ocean monitoring system to better understand and predict the ocean, its role in the climate system and its health	To provide high-quality data, services and product covering the global ocean and European seas in support to the research (climate and oceanography) and operational oceanography (e.g., CMEMS) communities with extensions towards biogeochemistry, greater depths and high latitudes
LifeWatch ERIC e-Science and Technology European Infrastructure for Biodiversity and Ecosystem Research www.lifewatch.eu Arvanitidis et al., 2016	e-Science research facilities to increase knowledge and deepen understanding of Biodiversity organisation and Ecosystem functions and services	The vision behind LifeWatch ERIC is to become the Research Infrastructure providing access to the world's biodiversity content, services and communities in one click	LifeWatch ERIC aims to accelerate the research effort of the scientific community by delivering a European state-of-the-art e-Infrastructure on biodiversity and ecosystem research: a Digital Twin which (a) provides access to, and support for, key scientific services by applying cutting-edge ICT technology, (b) enables reproducible analytics, (c) is co-designed and co-created with the user communities and (d) is tuned with the needs for research that provides key insights for society, in particular science-based policy	To offer new opportunities for large-scale scientific development; to enable accelerated data capture with innovative new technologies; to support knowledge-based decision-making for biodiversity and ecosystem management; to provide training, dissemination and awareness programmes

The role of the marine research infrastructures in the European marine observation landscape:
present and future perspectives.
Front. Mar. Sci. 10:1047251.
doi: 10.3389/fmars.2023.1047251

European Commission

RIs, website, references	Structure	Vision	Mission	Purpose
EMBRC ERIC European Marine Biological Resource Centre www.embrc.eu	Biological resources, services, facilities, and technology platforms in its 70 marine research organisations in 10 European countries. An 'omics based observatory is in operation since 2021 across 19 EMBRC sites	To advance the understanding of life in the oceans and to sustainably harness its potential for the benefit of humankind valuing quality and reproducibility in science, and holds itself to the highest ethical standards for working with living organisms	To provide access to marine biological organisms and their habitats for experimental purposes and applied research; to promote the sustainable use of marine resources, to deepen fundamental knowledge on marine organisms and their role in the environment, pushing the frontiers of science, to explore marine biodiversity for new products, inspiration, and innovation; to promote the use of marine experimental models in mainstream science	To advance fundamental and applied marine biology and ecology research promoting the development of blue biotechnologies
ICOS ERIC Integrated Carbon Observation System https://www.icos-cp.eu Macovei et al., 2020 Ocean Thematic Centre (OTC) https://otc.icos-cp.eu/	Standardised and open data from more than 140 measurement stations across 13 European countries to observe greenhouse gas concentrations in the atmosphere as well as carbon fluxes between the atmosphere, the land surface and the oceans. OTC currently coordinates 22 ocean stations in seven countries, monitoring carbon uptake and fluxes in the North Atlantic and the Nordic, Baltic and Mediterranean Seas	ICOS is a state-of-the-art infrastructure providing high-quality and relevant data for a broad spectrum of users who transform it for scientific breakthroughs, and for knowledge for climate action	To produce standardised, high-precision and long-term observations and facilitate research to understand the carbon cycle and to provide necessary information on greenhouse gases. We promote technological developments and demonstrations related to greenhouse gases by linking research, education and innovation	The ICOS Ocean Network provides long-term oceanic observations required to understand the present state and better predict future behaviour of the global carbon cycle and climate-relevant gas emissions
DANUBIUS-RI International Centre of Advanced Studies on River-Sea Systems www.danubius-ri.eu Friedrich et al., 2019	European river-sea systems, facilities and expertise; a 'one-stop shop' for knowledge exchange in managing river-sea systems; access to harmonised data; and a platform for interdisciplinary research, education and training	To achieve healthy River-Sea Systems and to advance their sustainable use, in order to live within the Planet's ecological limits by 2050	To facilitate and contribute excellent science on the continuum from river source to sea; to offer state-of-the art research infrastructure; and to provide the integrated knowledge required to sustainably manage and protect River-Sea Systems	To overcome the fragmentation of science, knowledge, data and management approaches in rivers and seas by integrating spatial, temporal, disciplinary and sectoral thinking providing science-based solutions to societal risks arising from global and climate change as well as coincident extreme events

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Horizon Europe supports (marine) research infrastructures

- INFRADEV: **Developing, consolidating and optimising** European RIs **landscape**, maintaining global leadership
- INFRASERV : **RI services** to support health research, accelerate the green and digital transformation, and advance frontier knowledge
- INFRATECH: **Next generation of scientific instruments, tools** and methods and advanced digital solutions
- INFRAEOSC: Enabling an operational, **open and FAIR EOSC** ecosystem
- INFRANET: **Network connectivity** - enabler for collaboration without boundaries

Support to **life cycle** of ESFRIs/ERICs, policy-making, int'l coop, skills...

Access (both challenge-driven 'areas' and curiosity-driven 'large domains')

Technology development including co-design with industry, digitalisation...

European Open Science Cloud '**EOSC**'

GÉANT

*Opportunities for individual RIs, but mostly **for small-medium groups of RIs and for large groups of RIs***

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Example: AQUARIUS project

EU Mission: Restore our Ocean and Waters

AQUARIUS will support transnational access for research and innovation projects that can demonstrate how they will integrate different research infrastructures and deliver to the goals of the EU Mission: Restore our Ocean and Waters.

With a 2030 target, the EU Mission: Restore our Ocean and Waters aims to protect and restore the health of our ocean and waters. Area-based "Lighthouses", will serve as central hubs and platforms for developing, demonstrating, and deploying solutions to identified challenges. These "Lighthouse" areas inform the geographic scope of AQUARIUS, whilst the thematic scope is informed by the three Mission objectives.

1. Protect and restore marine and freshwater ecosystems and biodiversity.

2. Prevent and eliminate pollution of our ocean, seas and waters.

3. Make the sustainable blue economy carbon-neutral and circular.

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RESTORE OUR OCEAN & WATERS

Source: https://aquarius-ri.eu/

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Example: AQUARIUS project (cont'd)

Source: https://aquarius-ri.eu/

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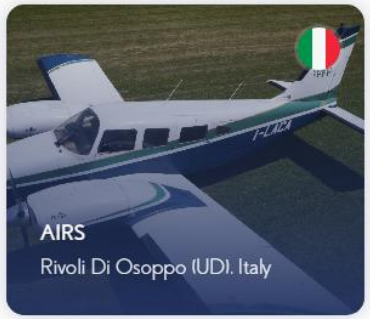

RI CATALOGUE

Choose your Infrastructure Type:

All Types

Choose your Lighthouse Region:

All Lighthouse Regions

"57 Research Infrastructures – One Catalogue"

Source: https://aquarius-ri.eu/

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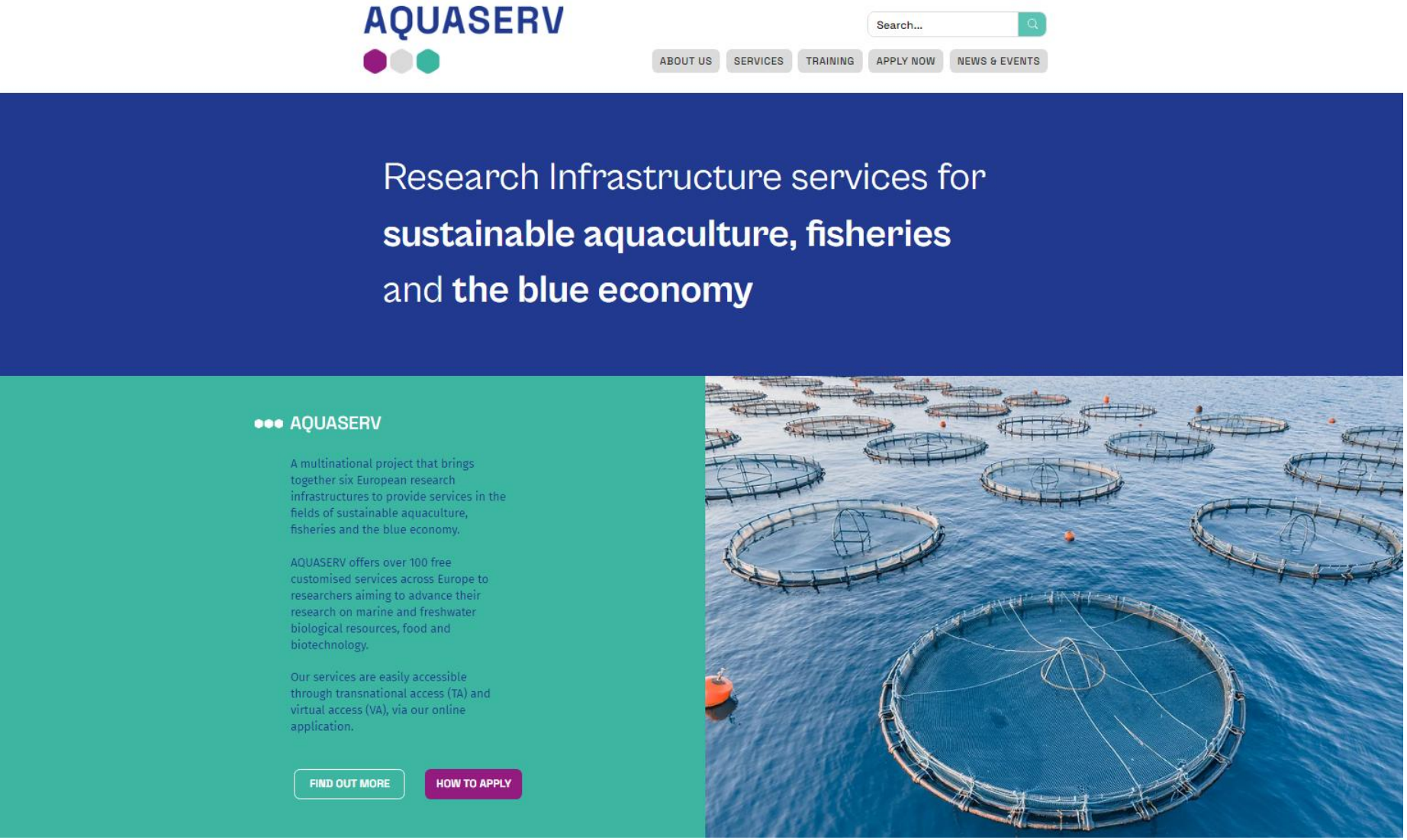
Example: AQUASERV project



Source:
https://www.aquaserv-ri.eu/

European Commission

Example: GEORGE project

Source: https://george-project.eu/

"The project's expert team develops **sensor technology** that can be integrated into **floats, moorings and ships** and used for **high-precision**, accurate measurements of **ocean carbon systems**. The goal is to develop five new sensors past the technology readiness level to be commercially produced."

ICOS Integrated Carbon Observation System

Euro Argo

emso ERIC EUROPEAN RESEARCH INFRASTRUCTURE CONSORTIUM

Thank you!

#ResearchInfrastructures
#EUResearchArea

European Commission