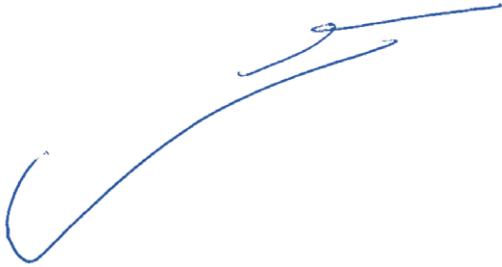


# STATEMENT OF OBJECTIVES

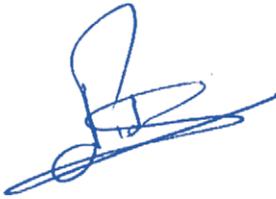
**State – Ifremer**

2019 — 2023

Paris, 8 June 2020



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Minister of Higher Education,  
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(French Research Institute for Exploitation of the Sea)

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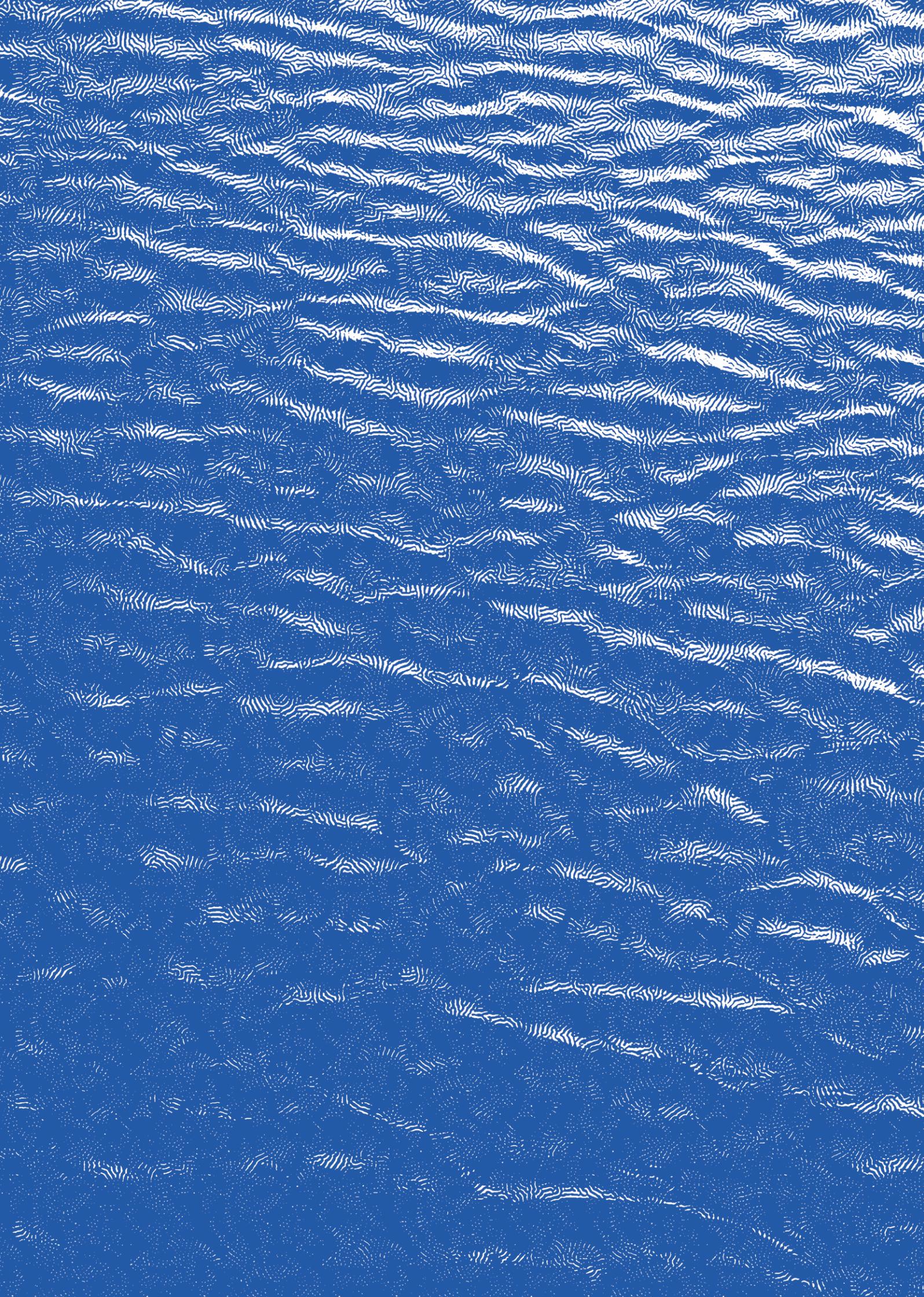
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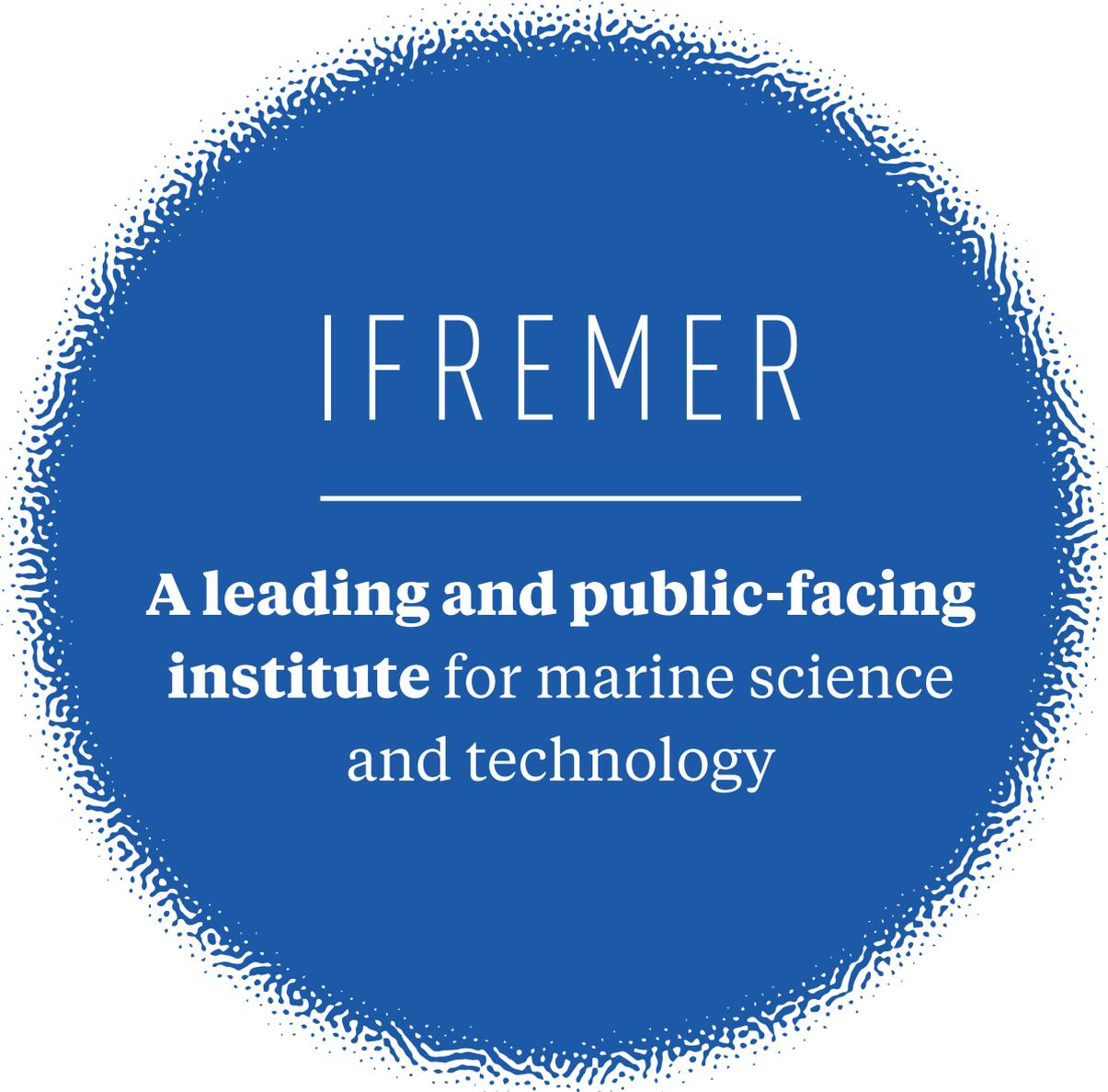
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IFREMER

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**A leading and public-facing  
institute** for marine science  
and technology

## A PROMISING AND CHALLENGING CONTEXT FOR MARINE SCIENCE AND TECHNOLOGY

For eons, the ocean has been a subject of curiosity and fascination verging on romanticism, and yet, it has been neglected and sometimes even forgotten by the scientific community. However, the ocean is an essential part of a number of significant issues that demand ever more research, innovation and expertise. Today, we believe that special efforts are necessary to explore the dual frontiers of our ocean knowledge and the “blue economy” and to preserve the ocean’s sustainability and health<sup>1</sup>.

Several different factors have led to this remarkable change in position:

- The amazing progress in submarine exploration technologies and the discoveries that they have led to, as well as the surge in satellite observation, in situ observation and modeling, which allow us to understand the ocean as a complex whole;
- The realization that the ocean is a common good, as is its vast biodiversity (the extent of which remains unknown) and the variety of the ecosystem services that it provides<sup>2</sup>; that it acts as an energy, climate and biogeochemical regulator of the “Earth system”; and that this common good is under threat;
- The geographic and strategic stakes associated with the importance of maritime transport in worldwide trade and in the growing concentration of human populations in coastal areas;
- The fact that the ocean is the last resource we have yet to fully exploit, while many continental mineral resources are growing rarer and more expensive and, more generally, the awareness of the potential that the blue economy holds for socioeconomic development<sup>3</sup>.

Over the past few decades, this growing awareness has been accompanied by the development of an international legal framework that still has room to evolve<sup>4</sup>, and by many European and international initiatives, including: the creation of mechanisms that aim to improve operational oceanography and common management of fishing; and international reports on the state of our oceans<sup>2</sup>, the developmental potential of maritime activities, and oceanographic research in general<sup>5</sup>, which will be complemented in 2019 by a special report from the IPCC focusing on the climate, the ocean and the cryosphere.

Two recent initiatives reflect this movement and will have a strong impact during the term of the Ifremer statement of objectives:

- First, the 2030 Agenda for Sustainable Development, which is the new framework for international development, entered into force on January 1, 2016. It is based on 17 sustainable development goals (SDG) that include 169 economic, social development and environmental protection targets. The 14th SDG, “Conserve and sustainably use the oceans, seas and marine resources for sustainable development”, aims to create a framework for sustainable management of marine and coastal ecosystems and protect them from the consequences of human activities<sup>6</sup>
- Second, at the United Nations Ocean Conference (New York, June 5-9, 2017), stakeholders were encouraged to get involved in the “International Decade of Ocean Science for Sustainable Development (2021-2030)”. All interested participants must work together for the success of this initiative through five goals related to developing and sharing scientific knowledge about the ocean, and they must contribute to the creation of a far-ranging action plan whose theme is “The ocean we need for the future we want”.

1. G7. 2018. Charlevoix Blueprint for Healthy Oceans, Seas and Resilient Coastal Communities. <https://g7.gc.ca/en/official-documents/charlevoix-blueprint-healthy-oceans-seas-resilient-coastal-communities/>

2. UN. 2016. The First Global Integrated Marine Assessment. [http://www.un.org/depts/los/global\\_reporting/WOA\\_RPROC/WOACompilation.pdf](http://www.un.org/depts/los/global_reporting/WOA_RPROC/WOACompilation.pdf)

3. OECD 2016. *The Ocean Economy in 2030*. OECD Publishing, Paris. [https://read.oecd-ilibrary.org/economics/the-ocean-economy-in-2030\\_9789264251724-en#page3](https://read.oecd-ilibrary.org/economics/the-ocean-economy-in-2030_9789264251724-en#page3)

4. In 1982, the United Nations Convention on the Law of the Sea, also called the Montego Bay Convention. In 1994, the creation of the International Seabed Authority (ISA) In September 2018, the first session of the intergovernmental conference on the conservation and sustainable use of marine biodiversity, called “BBNJ” (Biodiversity Beyond National Jurisdiction).

5. IOC-UNESCO. 2017. *Global Ocean Science Report. The current status of ocean science around the world*. L. Valdés et al. (eds), Paris, UNESCO Publishing. <http://unesdoc.unesco.org/images/0025/002504/250428e.pdf>

6. <https://www.un.org/sustainabledevelopment/fr/oceans/>

- In European and national research efforts, this dynamic has led to the 2011 launch of the joint European programming initiative “Healthy and Productive Seas and Oceans”<sup>7</sup>, to the creation of a specialized group within AllEnvi (the National Environmental Research Alliance), and to the inclusion of research priorities in different national strategies and in the plans and programs that put them into effect<sup>8</sup>.

## THE INSTITUTE’S STRATEGIC PLAN: GUIDELINES FOR A 2030 AGENDA

In this context, after having embarked on major changes and following its 2017 evaluation by the Hcéres (High Council for Evaluation of Research and Higher Education), the Institute has decided to focus on the longer term with a 2030 agenda:

During the previous statement of objectives, Ifremer made significant changes that affected its structure (transfer of headquarters from Paris to Brest; closure of two seafront laboratories and transfer of their staff to other sites), its internal operations (switch to GBCP [public management of accounts and budgets] and modernization of financial management tools), and its missions (unification of the French ocean fleet, redefinition of the expert consulting it can provide for public policy).

- The Hcéres evaluation of the Institute emphasized its technological excellence and noted the growing impact of its scientific activities. The evaluation also pointed out the tensions inherent in the trio of research/expertise/innovation within Ifremer’s missions and the need for the Institute to perform more outreach. Lastly, it underscored the human resources management challenges that the Institute faces.
- In the second half of 2017 and the first half of 2018, Ifremer began to redefine a 2030 “strategic plan”. This process drew on a self-evaluation report from 2016 and on the Hcéres recommendations from 2017.

About a hundred people from the Institute participated in it (through work groups), as did several dozen external experts. The process also gave rise to presentations in Ifremer centers and to debates within the scientific council and the board<sup>9</sup>.

### IFREMER, A LEADING INSTITUTE FOR MARINE SCIENCE AND TECHNOLOGY

This strategic plan firstly reaffirms the three missions that Ifremer was endowed with upon its creation in 1984<sup>10</sup>:

- **The pursuit of scientific and technological research**, which includes a special focus on the management of scientific infrastructures with national, European or international reach: this mission is clearly still essential as the importance of knowledge about the ocean has never been so great;
- **The pursuit of scientific and technical expertise to inform public policy and public authorities**: given the wide variety of expectations, the challenge here is to concentrate resources where the Institute can add the most value;
- **The support for innovation**: the InOcean initiative launched in 2017 tackles the challenges of the blue economy; it aims to diversify information-sharing and partnership strategies with economic stakeholders, beyond the usual interactions and types of services that have long dominated the sector.

The Institute’s strategic plan underscores the complementarity of these missions, which should reinforce each other more than ever as progress is made toward sustainable, multiple uses of ocean resources. In successfully giving equal attention to these three missions, the Institute will continue to serve its purpose to the fullest and strengthen its identity. Ifremer has a presence on all mainland French seafronts and in most of the overseas territories. The Institute keeps its multidisciplinary scientific and technological expertise up to date to best approach scientific subjects related to the ocean—from the coast to the high seas, from the seabed to the ocean-atmosphere interface, and from natural resources and environments to socioeconomic activities.

7. [www.jpi-oceans.eu/](http://www.jpi-oceans.eu/)

8. Sea program in 2012 following the Grenelle (multiparty summit) on the sea in 2008; National Strategy for the Sea and the Coasts in 2017; National Biodiversity Strategy in 2017; Livre bleu (roadmap) for Overseas France in 2018; annual decisions made by the interministerial committee on the sea (CIMer).

9. Ifremer. 2018. Notre projet d’institut. (Our strategic plan.) See: <https://wwz.ifremer.fr/L-institut/Annexes/Projet-institut-H2030>

10. cree no.84-428 dated June 5, 1984.

Ifremer has a capacity for integration that makes it a leading institute within the network of marine and maritime research establishments. This position enables it to interact with ministries and regional authorities affected by the ocean and with many partners from the maritime world, including economic actors and, increasingly, representatives of civil society. This position also leads the Institute to work with its peers in Europe and around the world and, on certain occasions, to be a linchpin for the French scientific community.

### CHANGING CURRENTS THAT CALL FOR A DIFFERENT APPROACH

This strategic plan has taken into account several other aspects of the changing context in which Ifremer operates:

- **Diversification of information sources**  
Long reserved for actors in the maritime world and in marine, civil and military research, access to ocean knowledge has broadened considerably thanks to progress in marine observation and to the rapid development of information and communications technologies. As in many other fields, ocean science now finds itself in an information society in which research no longer holds a monopoly on knowledge and must compete with other sources of information in collective choice processes.
- **Diversification of partners**  
In France and around the world, Ifremer is reputed for its crucial expertise related to marine and coastal ecosystems, their uses and their protection. This privileged position implies certain requirements for the analysis, explanation and anticipation of marine phenomena that affect maritime and coastal activities. The Institute must now communicate with a more diverse audience than before, which includes governments, the socio-professional world and even nongovernmental organizations. These new requirements call for reflection on the way the Institute provides expertise in societal debates and on relevant methods and tools.
- **Complexity of ecological and socioeconomic systems**  
Research entities are thus confronted with the dual challenge of clarifying the role of science in making decisions in an uncertain world and of communicating about the complexity of these systems and the uncertainty of how different changes may affect their future. Studying these systems requires the development of forms of research, collective expertise and forecasting that expand

the fields of knowledge relied on to construct answers to the questions posed.

These different aspects invite us to diversify the ways expertise and dialogue are shared between the Institute and society, by involving the general public in research activities through interaction with scientific stakeholders, communicators and outreach actors. This strategic plan manifests three ambitions:

- **An exemplary institute: ethics, scientific integrity and deontology**  
Exemplarity is a necessary condition for enduring trust between the Institute and society and for the successful realization of the Institute's various missions. In 2016, Ifremer became a member of the joint ethics consulting committee of the CIRAD and INRA research centers; membership was extended to the IRD (Institute for Research and Development) in 2018. The nomination of an advisor for scientific integrity, followed by the nomination of a mediator filled out the Institute's ranks to ensure this exemplarity.
- **An institute in step with society**  
A first goal is to develop partnership strategies that bring together private and public actors in various ways within the creation and implementation of research programs. Calls for expressions of interest will help draw out integrated, collaborative and participative approaches as well as long-term trajectories for marine social-ecological systems. A second goal is to improve scientific communication and mediation by raising awareness about the scientific process and by sharing research results with the general public, educational institutions (elementary and middle schools, high schools, universities), associations and businesses, either directly or through intermediary media. This includes working on the production, classification, communication and availability of data, images and videos produced by the Institute. The Institute must also collect questions that it receives from the general public.
- **A virtuous partnership between research and expertise provided in support of public policy**  
The goal is to shed light on public policies put forth by the federal government, regional authorities and business sectors.  
  
What is key here is sharing research results (knowledge or methods), moving toward a more integrated and systemic approach for providing expert opinions rather than offering one-off appraisals (while still preserving the Institute's independence), and raising new research questions through the work done to

inform public policy. In this spirit, focused work will be performed to better define coastal laboratories' and research units' activities.

Scientific opinions and research orientations play a major role here. These ambitions call for a cultural change at the Institute and for reflection on its scientific and technical practices. Two issues fundamental to our society depend on these changes: first, the role of science in collective decision-making, and second, sustainable development in an environment that has been weakened by human activity. Today, the ocean is considered to be a new economic frontier, with steady growth not only in traditional activities like production of live marine resources, maritime transport and tourism, but also in the development of new uses of the ocean, such as marine renewable energies (MRE) and the potential exploitation of mineral resources. This process of appropriation raises questions about actors' responsibility for the economic, social and environmental impact of their activities, and about public regulation.

## CONTENT AND STRUCTURE OF THE STATEMENT OF OBJECTIVES

This statement of objectives follows naturally from the strategic plan described above. The content of this statement also comes in part from the outcome of the previous statement of objectives and from discussions held in summer and fall 2018 with the ministries that supervise the Institute.

Given the importance of the United Nations Sustainable Development Agenda, we have highlighted the expected contribution of Ifremer scientific activities toward reaching some of the 169 targets of the 17 SDGs (p.44). We have also specified how they are relevant to the sea or the ocean.

This statement constitutes a 2019-2023 operating program for the general ambitions expressed in the Institute's strategic plan:

**43 actions have been identified.** They are different in kind: some have to do with activities, means and tools, while others are more directly related to the results expected by the end of the statement term (p.40-41).

### 19 indicators have been defined.

Each of them is accompanied by a summary describing its nature, its baseline value, the intended target and the methods used to calculate it (p.42-43).

These actions and indicators all refer to the six objectives that structure this contract.



“Understand and predict ocean evolution through 2100”, an objective that breaks down the scientific priorities laid out in the second part of the Institute's strategic plan



“Consolidate scientific knowledge and develop expertise to inform public policy”



“An innovative organization driving the development of the maritime economy”



“Get the most out of a unified fleet that serves all users”, particularly by launching a multiyear plan to upgrade ships and vehicles



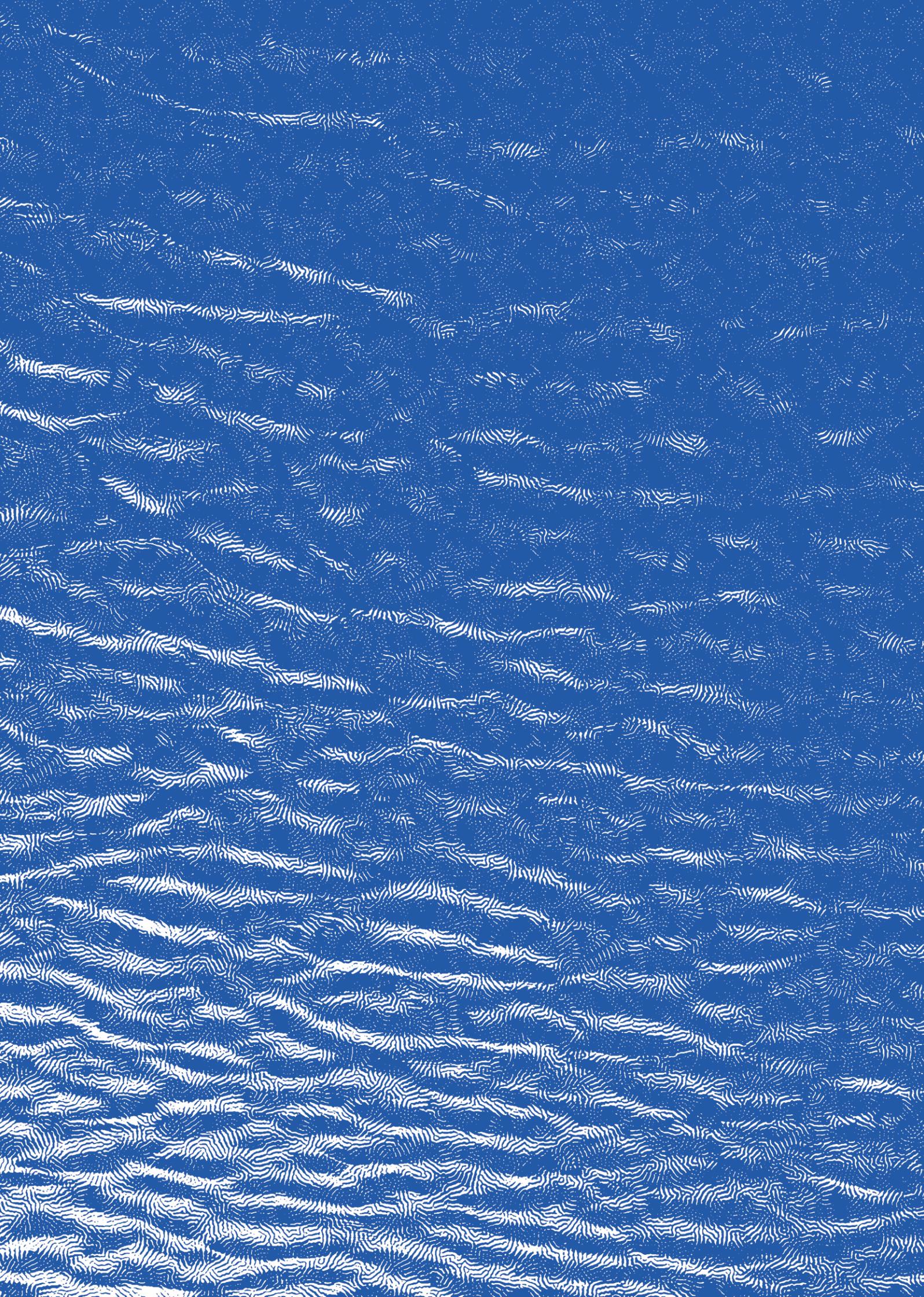
“A high-profile institute recognized across Europe and around the world”



“Improving the establishment's guidance and the use of its resources”

## FOLLOW-UP ON CONTRACT IMPLEMENTATION

The Institute will produce an annual report on the advancement of each element within the statement. This report will be examined with the supervising ministries, then presented to the Ifremer board at its first annual meeting, so that it can be reviewed along with the financial reports and the annual operations report.



# OBJECTIVE 1

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## **Understand and predict** ocean evolution through 2100

The Institute intends to design, develop and carry out an ambitious scientific endeavor to gather the elements necessary to understand and predict ocean evolution through 2100.

The focus is on deciphering dynamic processes of evolution and modeling the ocean system and the relationships between its components (water column, sediment, ecosystems, human activities) over the upcoming decades and the century as a whole. Accomplishing this objective is essential to sustainable management of marine and coastal socio-ecosystems within the context of climate change.

New knowledge is necessary to understand the profound changes occurring in our oceans (temperature rise, acidification, decrease in biodiversity, transformation of the cryosphere, etc.) and flesh out their possible trajectories and outcomes. Studying and understanding these phenomena is especially important given that most of them are accelerating. To date, the scientific community has only a limited understanding of these global processes, and has only performed preliminary evaluations of marine ecosystem resilience in regard to these rapid changes. There are no clear solutions for adaptation in the medium or long term.

The International Council for Science (ICSU) identified the main knowledge gaps that must be addressed in order to meet the SDGs adopted by the United Nations in 2015, particularly for SDG 14<sup>11</sup>. The ICSU also underlined the fact that integrated research, follow-up and data analysis, along with capacity development, are necessary to fill in these gaps. The oceanography knowledge gaps are summarized in the appendix. This view of the situation assumes that the scientific and technical foundations are solid and that it is time to rethink research.

## REINFORCE SOLID SCIENTIFIC AND TECHNICAL FOUNDATIONS

The Institute was founded on knowledge of the oceans from the observation and understanding of geological, physical, chemical and biological phenomena as well as from the study of marine resources and their ecosystems. It has achieved national and international recognition for its competence in these fields: creating, defining, and bundling means and methods for field observation; designing, populating and managing immense databases and information systems; and performing research on specific biological models or compartments that pertains to societal issues. This enables Ifremer to use measurements and long-term observations that span a wide range of fields (and to share this information with national and international stakeholders, both scientific and governmental), which contributes immensely to global knowledge of the ocean within the context of climate change.

This foundation of knowledge must be maintained because it is the very essence of the Institute. It can be broken down into many scientific

and technical subtopics that we have organized into five principal research domains for the 2030 strategic plan:

- ocean dynamics
- interfaces
- understanding and categorization of life forms within marine ecosystems
- ecosystem functioning, biodiversity, services and production
- anthropogenic pressure and socioeconomic issues

Many research structures, both within Ifremer and in partnerships with other entities, contribute to this strong foundation of scientific and technological knowledge.

## RETHINK RESEARCH

To achieve its full potential as an expert on ocean-related societal issues, Ifremer must be able to handle the challenges of the future and fully exploit the expertise it has acquired over the years. Coastal anthropization, rising sea levels, climatic events and growing need for marine resources require Ifremer to rethink its organization and the way it conducts research.

Marine scientists must be able to integrate data (measurements, observations, texts and images) at different scales and from varied sources in order to hypothesize about the future and model plausible scenarios that will inform the creation of sustainable ocean management policies.

It is time for a paradigm shift at Ifremer so that it can successfully decipher processes of evolution and model what ocean systems will look like through the year 2100.

This new phase for the Institute means planning out ambitious topics for research. It means being willing to innovate in order to meet technological challenges and broaden interactions with the public beyond the simple provision of information to guide public policy. Communication about the complexity of social-ecological systems and the uncertainty of what their future holds is a significant challenge.

11. International Council for Science (ICSU), 2017. *A Guide to SDG Interactions: from Science to Implementation*. D.J. Griggs, M. Nilsson, A. Stevance, D. McCollum (eds). International Council for Science, Paris.

## SIX SCIENTIFIC PRIORITIES FOR UNDERSTANDING AND PREDICTING OCEAN EVOLUTION

The Institute has chosen six main scientific priorities. These priorities were chosen based on what we need to learn about the ocean in the context of the changing research landscape, as well as societal and governmental expectations around decision-making assistance and the preservation and sustainable management of the ocean. These priorities have taken shape around scientific and technological issues whose investigation will help fill knowledge gaps and move toward achievement of the SDGs.

### UNDERSTANDING THE DYNAMICS AND IMPACT OF THE OCEAN'S EVOLUTION THROUGH 2100

ACTION

1

#### **Integrating ocean observation, modeling and evolutionary processes on decadal to centennial timescales to fine-tune predictions.**

With its track record of excellence in ocean observation and description of physical ocean processes, over time frames ranging from very short to decades, Ifremer must start creating projections of ocean evolution over longer periods of time, which is what society and public authorities need.

14

13

### UNDERSTANDING CLIMATOLOGICAL AND GEOLOGICAL EVENTS THROUGH A MULTI-SCALE APPROACH AND DATA FROM MULTIPLE SOURCES

14

13

#### **Understanding and predicting the genesis of extreme maritime weather events.**

The socioeconomic stakes of this research topic are high. Climate change influences the nature and frequency of so-called "extreme" events over a short time scale. The rise in sea levels tends to further exacerbate the consequences of these events. Therefore, it is important to study the relationship between the occurrence of these events and climate change.

14

13

#### **Understanding and modeling unusual climate events and their impact on ecosystems.**

It is now becoming possible to develop and manipulate integrated models of ocean environments from the deep seas to the coasts that include physics, chemistry, geology, biology up to a relatively high trophic level, the influence of watersheds and ocean interaction with the atmosphere. After the modeling phase, the next major task consists of applying data assimilation methods to these ecosystem models.

14

13

#### **Understanding and predicting underwater events.**

Submarine earthquakes and other phenomena that disturb sediment are the events that can have the most direct impact on coastal populations and marine infrastructures. Within the context of climate change, Ifremer is prioritizing events associated with destabilization of gas hydrates and with sediment redistribution linked to variations in sea level.

### UNDERSTANDING INTERACTIONS AT THE OCEAN-LITHOSPHERE INTERFACE

This interface is particularly important from the socioeconomic point of view. Many resources are concentrated here, including mineral, fishing, aquaculture and energy resources. This interface is also a key area for equipment that enables industrial activity in the sea (undersea cables, wind turbine foundations, etc.).

14

8

#### **Observing and understanding interactions at the ocean-lithosphere interface.**

It will be especially important to make progress on the bio-geological interactions that structure this dynamic and that also represent significant potential for innovation. The Institute's scientific expertise in lithosphere geodynamics, sediment dynamics, seafloor biology and ocean physics, as well as its ability to build innovative tools to explore the seafloor, drive it to study exchanges that take place at the ocean-lithosphere interface. Current limitations on observations of the dynamics at a small scale are essentially technological, and apply in particular to activities performed on the seafloor.

### UNDERSTANDING THE DYNAMICS OF HOW BIODIVERSITY AND ECOSYSTEMS RESPOND TO CLIMATE CHANGE

The scope of this scientific priority is far-ranging and it includes several different topics.

14

13

#### **Evaluating the future of coastal ecosystems in the context of climate change.**

At the land-ocean interface, the coastal ecosystem and its environment are exposed to a number of natural and anthropogenic pressures.

Understanding the variability of the coastal environment and of natural equilibria under these pressures, and understanding the current and future effects on ecosystem quality, is a constant concern for all stakeholders, whether they study, manage or use this environment.

**14**  **Describing sedimentary habitats in the context of climate change.** Understanding the determinism of sedimentary habitats, their sensitivity to forcing (natural and anthropogenic) and their vulnerability requires the removal of several methodological and conceptual barriers.

We are particularly invested in understanding the diversity of different scales (from the oceanfront to the foreshore) associated with sedimentary habitats, observing long sedimentary series and analyzing biological sediment archives.

**14**  **Understanding the dynamics of cumulative impacts through new evaluation methods.** This issue was identified by government authorities. Ifremer will approach these questions by adapting its observational networks and contributing to the creation of open, pan-European databases. **11**  **12**  **13**  The Institute will privilege the development of new facilities for characterizing biodiversity in situ.

**14**  **Identifying the effects of interactions between functional groups on the dynamics of exploited ecosystems.** This scientific task is essential for predicting ecosystems' dynamic response to climate change and the consequences of this change on ecosystem services. This will lead to better comprehension of biodiversity dynamics in relation to environmental heterogeneity, which is key for understanding the formation of biodiversity patterns and developing an integrated view of ecosystem and social-ecological system functioning.

**14**  **Evaluating resilience and anticipating state shifts and tipping points for social-ecological systems and their associated biodiversity.** It is important to be able to understand and model the way biodiversity dynamics respond, at different organizational levels, to global changes. We seek to specify how these reactions will affect ecosystem functioning, ecosystem services and related human activities like fishing, aquaculture, processing and pharmaceutical manufacturing.

## UNDERSTANDING AND PREDICTING THE EVOLUTION OF MARINE ORGANISMS WITHIN THE CONTEXT OF CLIMATE CHANGE

**ACTION 2**  This scientific priority, along with the sixth one described below, represents the greatest challenge in terms of science, technology and research structure.

**14**  **Identifying life forms' evolutionary and adaptive mechanisms.** The study of evolution, and more generally of adaptive mechanisms such as phenotypic plasticity, addresses a great variety of subjects,

from the most basic — like exploring the involvement of Archaea in the appearance of the first eukaryotes — to the most applied, such as how coevolution of hosts and pathogens explains certain epizootics in aquaculture species, the impact of breeding on the evolution of natural populations, and the evolution of life history traits in bio-resources in response to climate change. Addressing this subject requires the examination of different scales of biological complexity (from the cellular level up to populations, species and communities) and the use of experimental evolutionary approaches.

**14**  **Assessing the contribution of population genomics to ecology.** To do so, Ifremer uses existing facilities to explore critical issues in ecology and animal breeding. Collecting genomic and phenotypic data throughout a continuum from natural populations to breeding populations to experimental populations, for certain model species, represents an opportunity to learn about genotype-phenotype relationships in an integrated way.

**14**  **Identifying new marine bio-resources.** At the same time, through genomics and new techniques, the Institute will strive to characterize the ways they can be used and thus better understand and reproduce their potential as active ingredients.

## CREATING A SCIENTIFIC APPROACH TO SUPPORT FOR ADAPTIVE MANAGEMENT OF MARINE AND COASTAL SOCIAL-ECOLOGICAL SYSTEMS

This sixth scientific priority testifies to a willingness to unite many different disciplines through the Institute's wealth of knowledge and skills.

**14**  **Co-creating multidisciplinary programming to provide support for adaptive management.** The Institute intends to take up the challenges of ecosystem management and create a science of support for the adaptive management of marine social-ecological systems in situations of uncertainty. Such programming must be multidisciplinary and meld human, social, Earth, life and environmental sciences.

## FIVE VECTORS FOR PURSUING THESE SCIENTIFIC PRIORITIES

Along with these general priorities, there are five vectors that channel the Institute's technological expertise in observation and modeling:

- ACTION 3 • High-speed, multidisciplinary ecosystem observation using multiple platforms.** The Institute must be able to develop and consolidate multidisciplinary observatories that incorporate high-quality, standardized satellite and field data. An integrated, systemic and unified approach will be favored at the local, national and global levels.
- **Experiments that facilitate understanding of processes.** Ifremer has innovative experimental infrastructure and associated expertise in livestock agriculture that are unique in France. The goal is to decipher complex phenomena observed in the field by tracking environmental factors of interest, and to study the physiological effects on target species chosen for their economic or ecological significance (sentinel species).
- ACTION 4 • Integrated predictive modeling (multi-compartment, multi-scale, multi-use and multi-impact) of social-ecological systems.** Ifremer must provide diagnostic tools to shed light on the compromises between ecological, economic and social constraints. Understanding what society and industry expect will make it possible to create different management scenarios based on integrated models. This development is crucial for understanding the processes that govern the physics, biogeochemistry, dynamics and evolution of ecosystems and geological systems.
- **Observation of the seabed.** The oceanographic fleet's facilities must be adapted to make the necessary scientific measurements. Observational tools (sounders, seismic detectors), sampling tools and communications tools (fiber-optic capabilities, telepresence) must be improved. These tools must facilitate access to sampling zones by making underwater rovers smarter (augmented reality, artificial intelligence) and thus more autonomous.
- ACTION 5 • New technological developments that expand possibilities.** This refers to the design and development of tools and methodologies such as: extraction and analysis of environmental DNA from coastal, high-seas and deep-sea areas; development and harmonization of image processing and analysis tools; development of specialized drones;

design or integration of new miniaturized sensors (nanosensors, biosensors, smart and self-descriptive sensors, smart objects); development of markers to track fishery populations; and adaptation of big data and artificial intelligence technologies for marine science.

## INTEGRATE SCIENTIFIC PRIORITIES INTO THE TRIAD OF RESEARCH, INNOVATION AND SUPPORT FOR PUBLIC POLICIES

- ACTION 7** These general scientific priorities and the vectors for their realization will structure activities undertaken as part of research, innovation and support for public policies. They rely on multidisciplinary skills and an approach that must become interdisciplinary. The progress of this contract depends on a collaborative dynamic that promotes interaction among the three pillars of this triad. As a world leader in marine science and technology, as a partner of a variety of related entities, and as a stakeholder in geographic site diversity policies, the Institute wants to catalyze action.

### ENSURING THE RELEVANCE OF THE INSTITUTE'S CHOSEN THEMES

Regarding themes and disciplines, this strategic plan has two main research paths: the first one has to do with lithosphere-ocean-atmosphere interfaces and requires significant technological development; the second focuses on living resources, biodiversity, ecology and the evolution of marine social-ecological systems.

- ACTION 6** The creation of a strong interdisciplinary work culture, the desire to clarify the Institute's key themes both internally and externally, and the need to facilitate the creation of national and international consortia to respond to ever-more-competitive calls for tender all drive the Institute to reflect on whether the themes it has chosen will make its 2030 institutional project a success, and on its ability to guide research on these two paths to "Understand and predict ocean evolution through 2100".

## MAKING RESEARCH INFRASTRUCTURES MORE SUSTAINABLE, ACCESSIBLE AND INTERNATIONAL

The technological means and infrastructures at Ifremer's disposal are varied: observation mechanisms, experimental platforms, and information systems. These resources play an essential role: they bring different actors together, attract scientific talent and provide support for innovation.

### ACTION

8

Several of them are named in the national roadmap for research structures and some of them are considered TGIRs (Very Large Research Infrastructures). Due to its size (close to a third of Ifremer's budget), its history and its role within the French scientific community, the French oceanographic fleet merits special consideration (see § 4).

The Institute will increase the accessibility of its infrastructures to the socioeconomic world and improve resource-sharing within Europe and internationally. It will manage these infrastructures in a more transversal way in order to have a single set of policies that they all share, to establish consistency and to assure their financial sustainability.

### OBSERVATION AND EXPERIMENTATION FACILITIES

Ifremer intends to strengthen its leadership in the governance of several infrastructures dedicated to the observation of marine environments:

- It coordinates the TGIR EUROARGO and the European project JERICO-NEXT.
- It is also an active and essential partner of the European infrastructure EMSO as well as the national infrastructure ILICO.

The infrastructures focused on technology and on experiments with living beings are valuable assets that must be maintained even as the Institute pursues collaborations with other socioeconomic and research actors.

Regarding marine renewable energies (MRE), the goal is to transform THEoREM into a European structure as the next phase of the Marinerg-I project.

### INFORMATION SYSTEMS

The harmonization and consolidation of information systems—which allow immense datasets to be stored, used and shared—is a goal closely linked to observation and is part of the Institute's scientific strategy. Ifremer is actively involved with the Système Terre data hub through the ODATIS cluster and its leadership in the European infrastructures Copernicus and SeaDataNet.

The Fisheries Information System (SIH) has a country-wide view of fisheries resources and their uses; its creation made it possible to streamline the collection of fisheries data from different sources. The SIH fulfills a crucial need for expertise and research: fisheries-related sea surveys performed by Ifremer have become platforms for ecosystemic approaches that provide support for public policy (ex. CFP, MSFD, WFD) and research. To ensure high data quality, it is fitting to maintain the SIH and continue to expand its coverage in metropolitan and overseas France.

In the future, Ifremer will therefore develop two complementary activities: one focusing on the collection, classification, preservation and processing of larger and larger data volumes (data hub); and another that relies on scientific and technical expertise to capitalize on modeling and big data technologies.

### STRENGTHENING ACADEMIC REGIONAL SITE POLICIES

The Institute aims to contribute actively to the definition and implementation of regional site policies for higher education, research and innovation. Ifremer cannot achieve its ambitions for 2030 alone. Partnerships are essential; the goal is to assemble several multidisciplinary hubs for research and training. Regional site policies will be one of the Institute's priorities during the term of this contract.

Education, and particularly training through research, is an important part of this strategy given Ifremer's responsibility to contribute to the training of excellent researchers and engineers in key fields. Students and young researchers (doctoral and post-doctoral students) also play an important role in scientific production and international relations.

Regional academic site policies will vary from site to site and will fall into three main categories:

- consolidation of three main clusters that have been singled out by the PIA (French program for investment in innovation) and in which the Institute has significant weight;
- other French sites where partnerships will be adapted based on the Institute's local skills and resources and other establishments' strategies;
- overseas sites where the challenge is to create shared platforms for research and development.

## THREE MAIN SITES:

BREST, NANTES AND MONTPELLIER

ACTION  
9

An analysis of Ifremer's contributions to university clusters and scientific partnerships leads to the prioritization of three sites: a general and multidisciplinary site in Brittany, based in Brest; a specialized site in Pays de la Loire, based in Nantes; and another specialized site in Occitanie, around Sète, Montpellier and Palavas.

**Le Grand Ouest**, the western region, holds special importance to the Institute because its two largest centers are there: the Brittany center, which is the hub for units in Plouzané, Concarneau, Dinard and Lorient, and the Atlantic center, which oversees the units in Nantes, Bouin and Nouvelle-Aquitaine. These two centers represent more than two-thirds of the Institute's workforce. Furthermore, they have several points in common, including participation in the Graduate School for Ocean and Coastal Sciences (EDSML) in the Université Bretagne-Loire academic community (COMUE UBL); involvement in the Brittany Atlantic Ocean competitiveness cluster (PMBA); research interests in chemical contamination of estuaries; and the research infrastructure THEoREM, which is shared with the École Centrale de Nantes.

**The Brest site** is notable for its size (more than half of Ifremer's scientific personnel), for its dense concentration of actors partially or fully devoted to marine science and technology (Université de Bretagne Occidentale, ENSTA Bretagne, IMTA, ENIB, École navale, SHOM, various companies) and for their collective dedication. Ifremer is, of course, actively involved in all local entities specializing in marine studies; some examples are the EDSML, the LabEx Mer and (since 2018), the university research center ISblue, four mixed research units (LEMAR, LOPS, LM2E, AMURE) and the Bibliothèque La Pérouse (BLP). This is the main hub for the Institute, and the Institute must play a leading role at this site. Within the context of the university research center ISblue, Ifremer acts as a co-pilot and has spearheaded several initiatives, including one focused on training. Over the term of this contract, Ifremer will be a driving force in the internationalization of research performed at this site (to draw in more talent) and in the digitization of training courses, a major challenge for ocean sciences and the maritime economy, in alignment with its strategic plan.

**At the Nantes site**, scientific partnerships have fallen into place more recently, notably with the research collective Institut Universitaire Mer et Littoral (IUML). The subjects that the Ifremer units are working on (biotechnologies, microalgae and microbiology) are important to the Institute's strategy and receive good support from the Pays de la Loire region. The Institute is not associated with the inner circle of I-SITE NEXt (Nantes Excellence Trajectory) but several of its units interact and have MRE projects with the École Centrale de Nantes, again with strong regional support. The Institute's involvement at this site will be reinforced when it begins working with the Université de Nantes on the issue of "marine environment and health", which includes ecosystem health. The Institute will also work with the Institut Mines-Télécom Atlantique on AI and robots.

**In Occitanie**, Ifremer has an established scientific presence, with exceptional aquaculture facilities in Palavas and the MARBEC and HPEI mixed research units that work in the LabEx CEMEB and that contributed to the creation of I-SITE MUSE (Montpellier University of Excellence), so designated in 2017. Their main research subjects are marine biodiversity, integrative biology and sustainable management of natural resources and ecosystems.

Nearly 600 researchers, about fifty of which are from Ifremer, study the multi-pronged topic of the ocean/coast/resources at this I-SITE. Within MUSE, the Institute is co-piloting a key initiative called "Mer et Littoral" (Ocean and Coast).

TAILORED STRATEGIES AT OTHER MAINLAND  
FRANCE SITESACTION  
10

For other sites in or near universities that place less of an emphasis on marine sciences, or for which Ifremer's scientific teams aren't large enough, the goal is to create, maintain or strengthen connections with partners by formalizing them into collectives that make it possible to share facilities or create common projects, without (in the short term) seeking to create mixed research units.

At the **La Seyne-sur-Mer site**, the Méditerranée center joins forces with the Toulon-Marseille site to work on underwater robotics. The European Centre for Underwater Technology (CETSM) provides a meeting point for organizations and industrial actors. Ifremer teams also cooperate with the Université d'Aix-Marseille, the Université de Toulon and the Agence de l'Eau Rhône-Méditerranée (on contaminants).

At the **Boulogne-sur-Mer site**, the scientific interest group Campus international de la mer, currently led by Ifremer, brings together the Université de Lille; the Université du Littoral Côte d'Opale (ULCO); the National Agency for Food, Environmental and Occupational Health and Safety (ANSES); the National Center for Scientific Research (CNRS) and Ifremer. This scientific interest group has brought about the creation of a research collective, which will take effect in 2019.

The seafront stations, dedicated first and foremost to expert knowledge for public policy, will receive more support but are not intended to grow larger. They will have the opportunity to develop natural collaboration with nearby universities.

o Ifremer does not have a presence in Guadeloupe, but the **Martinique unit** is tasked with coordinating activities throughout the Antilles.

o **In Réunion**, several framework agreements signed in 2017 (with local government, the Natural Marine Reserve, the Réunion Sea Turtle Observatory and the Center for Sea Turtle Study and Discovery) are opening new avenues for research in the years to come.

• **In French Guiana**, partnerships have been set up with the LEEISA mixed services and research unit, which brings together the CNRS, the IRD and the Université de Guyane.

• **In Saint-Pierre and Miquelon**, Ifremer is the only research institution. Plans are in the works for the creation of a platform in partnership with the Université de Bretagne Occidentale to facilitate researchers' and students' studies in this part of the world.

In the future, overseas sites will have a role to play in the development of the Institute's international policy, in cooperation with the countries in the region where they are located.

This movement has already begun at the Pacific center, with New Zealand and Australia.

## EXTENDING OR BUILDING R&D PLATFORMS OVERSEAS

### ACTION 11

Regarding overseas France, the Institute wishes to maintain its capacities and is open to pooling resources with other partners at those sites in order to reach a critical mass and contribute to the development of these areas through research and training. The situation varies widely from one overseas territory to another:

- **The Ifremer Pacific Center**, based in Vairao (Tahiti, French Polynesia) also manages the two New Caledonian sites (Nouméa and Saint-Vincent). In both places, Ifremer has established partnerships; furthermore, one of the New Caledonia researchers and all of the French Polynesia researchers participate in the LabEx Corail.
  - o **In New Caledonia**, the Ifremer unit participates in CRESICA (Consortium for Cooperation for Research, Higher Education and Innovation in New Caledonia), which is a well-reputed R&D platform, and will join partners of the ENTROPIE mixed research unit.
  - o **In French Polynesia**, Ifremer participates in the EIO (Oceanic Island Ecosystems) mixed research unit in Tahiti and will collaborate with the CRIOBE mixed research unit (Moorea). The 2016-2021 cooperation framework agreement signed with the French Polynesian government provides support for pearl culture. Starting in 2019, Ifremer will contribute to the creation of the research consortium RESIPOL.
- **In Martinique and Réunion**, Ifremer units are in close contact with local researchers, although there is not yet a formally structured site.

# OBJECTIVE 2

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**Consolidate scientific knowledge** and develop expertise to inform public policy

Ifremer plays an important role by providing information to public authorities in very diverse fields, in order to facilitate decision-making (for example, via regulatory measures) and France's international strategy.

Through its own expertise and its ability to connect to other marine science bodies, Ifremer assists the French government with the implementation of the Common Fisheries Policy (PCP); marine framework directives (mainly the WFD, MSFD and MSPD); public policies related to animal and human health, energy and marine resources (MRE and marine aggregates); and international negotiations (the Extraplac program, biodiversity outside of national jurisdictions).

## ACTION

12

The quality of the support Ifremer provides for public policy depends heavily on its dedication to research and the latest advancements. The objectives set in this chapter are broad and transversal. They will be broken down into specific action plans co-written by the Institute and the relevant department of the French administration (DEB, DGEC, DGAL, DPMA).

## MAINTAIN HIGH-QUALITY EXPERTISE THAT MEETS PUBLIC AUTHORITIES' NEEDS

### ENGAGING WITH THE GENERAL PUBLIC AND TAKING PUBLIC AUTHORITIES' NEEDS INTO ACCOUNT

## ACTION

13

Society at large (the government and civil society actors) expects that the Institute will acquire knowledge, evaluate information, and offer recommendations about important topics. It is crucial for Ifremer to identify these topics. If Ifremer wants to be able to respond to tomorrow's needs, then it must set up research programs capable of providing new knowledge today. The Institute's work schedule must include monitoring actions and mechanisms that are attuned to society's expectations. Ifremer plans to fulfill this duty by strengthening its participation in existing bodies (COMER, for example), organizing forums on coastal and ocean research, and creating a research steering committee, as other organizations have done. The high-priority issues revealed by this monitoring will be subject to scientific study as called for in the Institute's strategic plan.

Ifremer will sign a charter for public entities involved in research, expertise and evaluation of health and environmental risks that wish to affirm their openness to the general public. The current signatories are the ANSES, the BRGM, IRSTEA, Santé Publique France, the IFSTTAR and the IRSN. Ifremer's signature will testify to its willingness to attend to French society's needs. Better integrating important societal topics into its work will reiterate a goal that was not fully achieved in the previous statement

of objectives, which aimed to identify the government's needs for knowledge and scientific backing in the years to come.

### IFREMER, A LEADING MARINE SCIENCE INSTITUTE: THE CONSEQUENCES OF ITS EXPERT ROLE

Leadership in marine science and technology does not come without consequences in the area of support for public policy. It is necessary to communicate with all actors that may contribute to scientific and technical expertise; know their skills and resources; and be capable of great feats of coordination, which cannot be subsumed into hegemony.

A first goal will be to draw up a national map of skills that can be called upon for various types of expertise, while taking into account that the ways to reach out to and collaborate with other organizations and establishments, as well as their experts, must be agreed on by both the sponsors and the actors involved.

For public health and animal health topics, this means more and better collaboration with geographical departments' laboratories and with the ANSES, to monitor and track the emergence of new issues. This is a significant area of work for the Institute, which signed a cooperation framework agreement with the ANSES in February 2018.

Regarding fishing and environmental topics, the national skills map will identify the institutes, universities and research centers whose expertise could be better leveraged to provide scientific and technical support to the DPMA and the DEB (an effort that would align with the Institute's vision for greater scientific and technical coordination overall) if the government so wishes.

### IFREMER, THE GOVERNMENT'S FOREMOST REFERENCE FOR MARITIME SCIENCE

## ACTION

14

In addition to creating this national map of skills, Ifremer will take stock of the usage, maintenance, renewal and reinforcement of its own expert skills. This exercise in reflection will require input from the ministries to define their needs for expertise in the short term, and, more importantly, in the medium and long term. This work will simultaneously identify any missing skills.

Developing forward-looking management of jobs and skills (GPEC) will enable the Institute not only to maintain its sector-specific expertise by identifying and tracking each individual's skills through their career path, but also to spot employees with well-rounded expertise and create a rewarding career

path for them. More work will be done to better acknowledge the value of support for public policy in staff evaluation and progression at Ifremer.

## CREATE WAYS TO SHARE INNOVATIONS PRODUCED BY RESEARCH TO CRAFT MORE EFFICIENT PUBLIC POLICIES

The needs expressed by public authorities, both national and European, feed into the Institute's scientific dynamic by spurring it to investigate new research questions. This research produces results that can be shared with other actors (sampling protocols and methods, new technologies for observation and analysis, etc.) or used to inform regulations (establishment of indicators and thresholds, proposals for management measures). Ifremer will oversee the appropriation of knowledge, facilities and methods resulting from its research by different actors from the design phase through to the evaluation of public policies. To this end, the Institute will collaborate with other entities to identify the best ways to exchange these assets. During the term of this contract, the effectiveness of these means of sharing will be evaluated.

Data access is included as a type of information or knowledge exchange, whether it is made accessible to the government or to other actors. Following recent regulations on access to public environmental data, such as the 2016 Lemaire law that aims to encourage dissemination of public research results and assimilates scientific data into public information, the Institute intends to fulfill its duty as a purveyor of marine knowledge by making the data it generates and stores available to the general public. Ifremer is committed to data accessibility and to closer connections between research information systems and support for public policies. Its involvement in the Marine World Information System (SIMM), both alongside and on behalf of the French Agency for Biodiversity (AFB), represents one of the firm commitments of this contract.

Research performed in response to public policy objectives can also be beneficial to blue growth by encouraging innovation and business development. The Institute will identify and describe the sectors that have potential for innovation and knowledge transfers.

## PROVIDE SUPPORT FOR FUTURE PUBLIC POLICIES

### STRENGTHENING THE ROLE OF LEADING LABORATORIES

**ACTION 15** The Institute's expertise owes much to the "flagship laboratory" designation of two laboratories that bring real added value to public policies concerning consumers' health security (microbiology) and animal health (for shellfish resources). This leadership role also extends to Institute laboratories without the flagship designation, which still have recognized expertise that makes them accredited laboratories for subjects like marine toxins, marine chemistry and hydrobiology, marine environment quality, and fisheries science. **To further improve this expertise, one unified quality management system will be rolled out for the supervising laboratories.**

### SUSTAINING SCIENTIFIC EXPERTISE BY PROVIDING SUPPORT TO PROJECT OWNERS

**ACTION 16** **More broadly, Ifremer is involved in monitoring. The flagship and accredited statuses of its laboratories enable it to advise the government on possible evolutions of public policies, especially with regard to monitoring devices and networks. In this field, the Institute's goal is to act as a consultant instead of a contractor when involved with monitoring devices operated on behalf of the government.**

**Handing over proven monitoring mechanisms that no longer contribute to the Institute's scientific excellence and for which there are alternative long-term operators is a vital goal of this contract. This position could be modified for specific domains that require ongoing contractor-style support.** Ifremer is committed to ensuring the continuation of these mechanisms, if the government requests it, by helping to identify subsequent operators and by guaranteeing the continuation of the relevant scientific expertise so that the quality of the data and results will be maintained as new mechanisms are implemented.

**Furthermore, this stance allows Ifremer to free up resources so that it can stay abreast of the latest technological innovations and develop its expertise with regard to emerging dangers. By doing so, the Institute will thus be able to advise the government on the future evolutions of monitoring mechanisms. Monitoring in the future might involve new, mixed observation mechanisms that combine monitoring actions intended to inform public policy with scientific observations.**

### ADVISING THE GOVERNMENT ON THE IMPLEMENTATION OF NEW MECHANISMS

This advice and assistance for the government may extend beyond the topic of monitoring mechanisms, to the general implementation of public policy; Ifremer's support for the General Directorate of Energy and Climate (DGEC) in the domain of marine renewable energies is framed thusly.

ACTION

17

The implementation of efficient monitoring for the MSFD also implies regulation of new mechanisms that are adopted, particularly when they have to do with the French oceanographic fleet. More generally, the Institute is in favor of consistent scientific and operational regulation across the different monitoring activities that fall within the various marine directives and policies (MSFD, WFD, MSPD, DHFF-DO, CFP). Ifremer's involvement in this operational monitoring will extend only to subjects that complement its research orientations.

### ENSURING BALANCED FUNDING MECHANISMS

Finally, Ifremer and the government will aim to adopt more balanced funding mechanisms for activities that support public policy. Each activity will undergo a comprehensive evaluation to determine whether it is best suited to public procurement (80% funded by the government) or if it holds equal value for Ifremer's scientific objectives and for the government's own objectives (50% funded by the government). A general report will be drawn up to check the government funding percentage of projects that provide information for public policy.

# OBJECTIVE 3

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**An innovative organization**  
driving the development  
of the maritime economy

By 2030, many sectors of the ocean economy  
will have greater growth prospects than the world  
economy as a whole.

## SIGNIFICANT POTENTIAL BASED ON SCIENTIFIC EXPERTISE

The European commission, recognizing this great potential, presented a “blue growth” strategy in 2012 that highlighted France’s prominence. France must take advantage of this potential for economic development by tapping into its rich scientific resources, which Ifremer is an expert in. The spectrum of Ifremer’s experience, skills, knowledge and infrastructures covers, at least partially, the five sectors that the OECD considers to have strong potential for growth in the blue economy:

- marine renewable energies
- marine biotechnology
- aquaculture
- tourism
- marine mineral resources

## A NEW DYNAMIC WITH THE InOcean INITIATIVE

During multiple external evaluations, the issue of Ifremer’s interactions with the socioeconomic sphere and its contribution to innovation was raised. In 2018, in order to introduce a new dynamic and play a bigger role in the development of the maritime economy, Ifremer launched the InOcean initiative. This initiative aims to encourage innovation within the Institute’s practices. It needs to permeate the different components of the Institute and give rise to intersections and topics for debate. InOcean is not a one-time operation that identifies work areas that are favorable to innovation. It is an overarching initiative that will continue to guide the Institute over the long term.

### ACTIVATING THE INITIATIVE: “FOCUS INNOVATION” WORKSHOPS

To provide support for the initiative, the Institute is holding “Focus Innovation” workshops dedicated to subjects that hold great potential for Ifremer.

These workshops bring scientists, managers, directors and industry representatives together to discuss the purpose of the Institute’s research and its socioeconomic impact. They lead to the formulation of concrete actions to take and provide the necessary elements to guide teams and departments and clarify their objectives. In 2018, the first subjects targeted

were marine biotechnologies applied to healthcare, cosmetics and biopreservation; structures and materials for marine renewable energies; and underwater optical communications.

At these workshops, new ways to bring innovation to companies were tested with specific cases: spin-off groups were created, investments were agreed on, and outside innovators were invited. This statement plans for the Institute to continue on this path by holding more Focus Innovation workshops.

### DEVELOPING A CULTURE OF INNOVATION AT IFREMER

Fostering a culture of innovation requires internal work on the Institute’s operating procedures, its collective ambitions and the ambitions of each of its employees. The internal InOcean initiative must be directed by a dedicated structure (to be established) that will be supported by the other directorates and by higher management. This structure must work closely with the scientific directorate to clarify laboratories’ goals, initiate new collaborations, identify promising topics and make projects more transversal.

**Change recruiting criteria and how career evaluations are performed.** To achieve this innovation goal, it is also necessary to change the way staff are evaluated to take into account their participation in innovation. Furthermore, when Ifremer seeks to hire in the future, it will be on the lookout for talent with the potential to carry on and expand promising innovative actions.

### **From concept to prematuration: encouraging research teams to innovate.**

A policy of strong encouragement for innovative projects will be supported through the use of calls for expressions of interest focusing on projects in the pre-maturity phase, through value-adding and innovation training for teams, through tools that yield financial returns for the teams involved in this type of project and through related communication.

**Strengthening the links between the scientific directorate, support for public policy, and innovation.** To figure out how to balance the Institute’s different missions, it will be necessary to have more dialogue between the scientific directorate, the coordinators of support for public policies, and the to-be created innovation directorate. This dialogue must routinely return to the divisions’ roadmaps and make it possible to fine-tune teams’ missions. The Focus Innovation workshops will provide useful elements for this dialogue.

## CREATING MORE CONNECTIONS WITH THE INDUSTRY

ACTION  
19

The InOcean initiative is an internal initiative formulated with external stakeholders: local, national, European and international industry representatives; innovators (CVT [consortia for added value], SATT [companies accelerating technology transfer], competitiveness hubs); and research centers, among others. InOcean's success depends on a policy of openness to the business world:

- Opening up to companies to integrate industry challenges into Ifremer's scientific investigations and challenge existing solutions
- Diversifying interactions: creating start-ups, fostering open innovation (collaborative projects, shared laboratories), inviting private companies to the Institute's sites
- Getting involved in structures that support innovation (competitiveness hubs, value-adding structures, incubators, etc.)

This policy of openness consists of the following actions:

ACTION  
20

- **Writing and disseminating an intellectual property (IP) policy.** Ifremer will implement a clear IP policy and publish it on its website in order to clarify the terms of its relationships with economic actors.
- **Formalizing interactions with industry representatives, start-ups, SMBs, intermediate-sized businesses and large groups.** Here, the goal is to set up framework agreements with critical industry representatives to share common roadmaps. Concerning SMBs and intermediate-sized businesses, the Institute will adapt its policy to the particularities of these structures.
- **Developing open innovation activities.** Opening Ifremer sites, in line with the multiyear property plan, to collaborative projects, private companies, start-ups, entrepreneurs and shared laboratories will foster these interactions. CIFRE theses (which represent a contract between a company, a research laboratory and a graduate student) will be encouraged.
- **Revising the spin-off policy.** The creation of start-ups is a key part of achieving innovation in the business world. The implementation of a new policy for spin-offs and entrepreneurship is essential to give a framework to people who are eager to start this adventure.
- **Pursuing ambitious research partnerships in compliance with the Carnot label's practices and criteria.** The goal is to prepare Ifremer's eventual candidacy for future Carnot label (ANR [National Agency for Research]) calls for applications.

## STRENGTHEN TIES WITH INSTITUTIONAL ACTORS IN INNOVATION

Since Ifremer wishes to optimize its processes and be effective, it must turn to the existing ecosystem of innovation. Existing structures are relay points to help Ifremer develop its network, acquire project funding, and conduct technical and economical monitoring of promising sectors. The following areas of work will be emphasized:

- **Coordinating Ifremer's involvement in competitiveness clusters.** Ifremer intends for its involvement in competitiveness clusters to be coordinated by the structure in charge of innovation through participating in the governance of hubs that focus on the ocean (Pôle Mer Bretagne Atlantique, Pôle Mer Méditerranée, Aquimer), drawing on the Institute's regional strengths and ensuring that information is relayed to the different departments.

ACTION  
21

- **Structuring project development.** A budget must be drawn up and resources must be allocated to the development of innovative projects. Collaborations with SATTs will also increase the project's development potential.
- **Using regional incubators for start-up projects.** When creating start-ups, Ifremer will collaborate with incubators near its teams (such as those at technology hubs) to support the project teams, ideally in compliance with the Institute's geographic diversity policy.

## DEFINING AND IMPLEMENTING GUIDANCE FOR THE InOcean INITIATIVE

The approach described must bring about profound cultural change involving all Institute actors. It will unfold over a long period and will need to be recalibrated from time to time. Once launched, the initiative will be punctuated by Focus Innovation workshops—three events per year—and by annual calls for expressions of interest (AMI).

ACTION  
22

Progress will need to be measured over time, as will obstacles and the degree of buy-in from both staff and upper management. A follow-up survey will be created at the beginning of the contract. How its results are used will be very important.

One of the key benefits will come from the dialogue established after the responses have been analyzed in sufficient detail. The results will be discussed and improvements will be sought.

# OBJECTIVE 4

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**Get the most out of a unified fleet that serves all users and launch a multiyear plan to upgrade ships and vehicles**

The French Oceanographic Fleet (FOF) TGIR was unified under Ifremer's guidance on January 1, 2018 via budget unification within the Institute, definition of specifications for use of the fleet, creation of a dedicated directorate (the Oceanographic Fleet Directorate, or DFO), and establishment of a leadership group open to other entities involved (the fleet's executive committee) and to the scientific community (national fleet commissions).

Ifremer receives a subsidy from the ministry in charge of research for the management of the unified fleet. The Institute has taken over the IPEV's managing role of the *Marion Dufresne* as a sub-charterer of the TAAF. It is also a bare-boat charterer of the IRD's ships and has signed an operating agreement with the CNRS regarding its coastal vessels, which will be managed by the GIE Genavir and then by Genavir's successor starting in 2020.

The DFO brings together all of the technical resources directly used for the TGIR within the Institute. It is in charge of schedules for the whole TGIR based on a set of specifications that define the multifunctional goals of the fleet's use<sup>12</sup>. It is subject to quality assurance, as is the rest of Ifremer.

The new structure is managed in compliance with the specifications and involves all stakeholders in a balanced way:

- An executive committee that the DFO reports to, which is composed of representatives from the CNRS, Ifremer, the IRD and the network of marine universities, and which is presided over by the ministry in charge of research
- A scientific advisory board (Comité scientifique consultatif ouvert à des experts européens) and evaluators (CNFH and CNFC) that continue to play their role as scientific evaluators of campaign proposals

## ACTION

23

Multiyear budget planning aims to sustain the Fleet TGIR's missions over the long term, balancing the expectations of the various establishments involved and of the scientific community at large with the ambitions expressed in the Institute's 2030 strategic plan. By the end of 2019, Ifremer must produce a viable medium-term plan, to be reviewed every two years, for five years of operations and ten years of investment. This budget plan will include all of the fleet's resources, both marine and submarine. It will account for the possibility of pooling or exchanging resources with other national or European operators (for example, the French navy).

## IMPROVE SERVICE QUALITY FOR USERS

Given the current situation, service improvement for the user community depends on:

- Commitments to regular trips to faraway areas like the Pacific, accumulating 450 days of deep-sea activity and 960 days of coastal vessel use. An intermediary report on progress toward these objectives will be written and the objectives will be adjusted in 2021 if necessary, based on budget changes and other factors.
- A time limit for carrying out properly scientifically evaluated campaigns, within the number of days available for scheduling (depending on the FOF's budget). The limit has been set at three years (campaign evaluated in year N-1 and planned for year N, N+1 and/or N+2).

One of the upcoming challenges is maintaining French ships' and scientific teams' access to certain high-interest areas, since many countries have been claiming or obtaining the right to extend their exclusive economic zones, and many maritime areas have been closed off to outsiders as they become sovereign assets. Ifremer has taken the opportunity to voice this issue to the Ministry of Europe and Foreign Affairs. It will ensure, with support from the ministry in charge of research, that this initiative yields concrete results.

Furthermore, the fleet is an excellent tool for making connections with the business world; it represents Ifremer when it participates in a balanced, mutually beneficial partnership with industry actors. These partnerships will continue to be promoted in the future in the spirit of complementarity and scientific cooperation.

This commitment, which serves Ifremer's partnerships, will be subject to geographic priority, an important factor when optimizing planning for deep-sea vessels.

## TOWARD MORE EFFICIENT MANAGEMENT OF NAVAL ASSETS

To better manage naval assets, it will be necessary to streamline investments and achieve greater flexibility in the use of these assets. These two conditions go hand in hand with the guarantee of high-quality service at a lower cost.

12. [https://www.flotteoceanographique.fr/content/download/31569/213607/file/17-03-08\\_Cahier\\_des\\_charges\\_de\\_la\\_programmation\\_des\\_navires\\_de\\_la\\_FOF\\_unifiée\\_vfsmq.pdf](https://www.flotteoceanographique.fr/content/download/31569/213607/file/17-03-08_Cahier_des_charges_de_la_programmation_des_navires_de_la_FOF_unifiée_vfsmq.pdf)

## ACTION

24

To optimize planning for a larger number of multifunctional ships, the *Marion Dufresne* and the IRD's ships will be outfitted so that each can accommodate some or all of the TGIR's mobile equipment. The *Marion Dufresne* will be reconfigured to house the underwater ROV *Victor 6000*, while the *Antea*, a coastal vessel that can be operated in the Indian Ocean or in the Antilles, will be modified to deploy the HROV *Ariane*. The acquisition and processing systems developed by Ifremer will be duplicated and used throughout the fleet, allowing for acquisition and transmission to Sismer (Scientific information systems for the sea), which Ifremer manages.

## ACTION

25

The GIE Genavir's term was renewed for four years in January 2016. During the previous contract, efforts were made to reduce HR costs. Particular efforts were made to shorten technical stops and reduce maintenance costs. These corrective actions should create acceptable conditions for Ifremer to take over management of the CNRS coastal vessels, which is planned for early 2020 at the latest.

## ACTION

26

The GIE Genavir's term is over at the end of 2019. By this date, after having conducted a comprehensive analysis in 2019, Ifremer should have come to a conclusion about how to ensure service continuity with lower costs starting in 2020. The GIE's ability to evolve will determine its ability to offer high-level services for the fleet. It could potentially open up to other public or private entities in order to bring down costs and streamline its workforce. A heightened sense of duty toward specific objectives will be a key element of the new GIE cycle.

## HIGH EXPECTATIONS FOR THE FRENCH OCEANOGRAPHIC FLEET IN EUROPE

The unification of the fleet is a boon for both the Institute and France when it comes to European resource-pooling: it promotes shared use, technological development, and common design practices.

## ACTION

27

The EUROFLEETS2 project, overseen by Ifremer, sought to integrate the various European research fleets. Even if concrete results in this area are far off, Ifremer's management of these projects has been unanimously acclaimed, and has cemented the Institute's renown within Europe. The potential of this asset should be harnessed and Ifremer should retain this role.

Ifremer is a partner on the new proposal EUROFLEETS+, which was submitted to the H2020-INFRAIA2018 call for projects led by the Irish Marine Institute, and co-leads the European Marine Board (EMB) work group targeting European research fleets. The deliverable expected from this work in 2019 is a new document replacing the previous policy document from 2007.

With regard to operations, Ifremer intends to strengthen its position within the Ocean Fleet Exchange Group (OFEG), which brings together the six countries with the most involvement in open seas research by expanding the possibilities for mobile equipment sharing, with the goal of offering the national community a wider range of services in these domains.

On the subject of underwater vehicles, the Institute will invest heavily in R&D to carry out its current plans: the development of a deep-sea AUV and a latest-generation ROV. Ifremer is seeking promising synergies and collaborations with European partners, particularly German ones, and will extend this search to payloads and payload sharing to obtain the best cost-benefit ratio.

## THE CHALLENGE OF MAINTAINING AND RENEWING SKILLS

## ACTION

28

On January 1, 2018, 20% of the 73 people working with the DFO were over 60 years old, and 11 of those people left the Institute in 2018. At the same time, the fleet operated by Ifremer added three more ships in 2018. Ifremer will finish restructuring its naval operations hub (a process that began in 2018), hire more engineers, and upgrade the DFO's skills so it will be in a better position to tackle new R&D challenges in the development of new equipment and innovative tools. Particular attention will be paid to the way this directorate's skills complement the skills of other R&D teams within the Institute.

## STRONG COMMUNICATION FROM THE FLEET TGIR

ACTION

29

The communication strategy of the Fleet TGIR will have three pillars:

- A new graphic style guide will communicate both the unity of the Fleet TGIR as it serves the national scientific community and its backing from Ifremer.
- Communication targeting the general public and institutions, focused on its infrastructure and skills (resources, technological projects, R&D) will from now on be linked with communication about activities conducted by the TGIR.
- Its main communication tools will be the fleet's website and an annual activity report.

The nomination of an assistant director who liaises with the scientific community will strengthen the relationship with this community within the context of large scientific programs, especially by managing interactions related to technological advancements and by organizing science and technology events several times per year.

## A MAJOR PROJECT: RENOVATING THE FLEET AND ITS FACILITIES

Ifremer is now in charge of the fleet's longevity. Its ambition in this regard is to create a realistic plan for the fleet's evolution that maintains seafaring resources, develops the most innovative equipment and is compatible with the scientific goals identified.

The fleet's strategic and scientific advisory board (COSS) thus released a new long-range planning statement in spring 2017, and the fleet mission produced its first 2035 guidelines at the end of 2017. Ifremer continued this work in 2018:

- Regarding the urgent renovation of coastal vessels, based on a statement of needs validated by the fleet's executive committee on July 17, 2018, a 15-year renovation plan centering on three intermediate-sized ships (35 m/40 m) and two smaller coastal vessels (25 m/30 m) that can work in shallow waters was presented in 2018.
- Regarding deep-sea vehicles, the ministry in charge of research, which leads the fleet's executive committee, has confirmed that a setup with two vehicles (operating in project mode and/or in exploration mode in a reduced area) and one survey device (AUV 6000 Coral) was their preferred one for the future. In 2018, the fleet's executive committee endorsed a scenario that phased out the manned submersible

Nautile by 2025 and called for the addition of two unmanned underwater vehicles to the fleet — a new ROV and a modernized Victor 6000.

A phase 0 trial was conducted in 2018 to explore solutions for continuing to meet the needs of operations that currently use Victor 6000 and Nautile while accounting for new, emerging needs by integrating mature or nearly mature technological advancements.

By the end of this contract, Ifremer will have: delivered the deep-sea AUV Coral (a program that began during the previous contract); modernized the Pourquoi Pas?; finished the mid-life renovation of three coastal vessels; added the first intermediate-sized ship to the fleet (midshore); created a procedure for adding the next ship(s) to the fleet and started the related projects; and reached the appropriate stage of technological development to ensure operational continuity with two unmanned deep-sea vehicles by the 2025 deadline.

Along with accomplishing these tasks, Ifremer will use this time to plan the renovation of three open-seas ships, which will start during the next statement of objectives. The possibility of pursuing partnerships with the TAAF and the French navy should be considered in order to clarify the Institute's strategic priorities for the next statement of objectives.

# OBJECTIVE 5

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**A high-profile institute**  
recognized across Europe  
and around the world

Ifremer enjoys a highly visible and prominent position in Europe and internationally due to its broad range of activities and expertise.

The Institute's partnerships and cooperative agreements speak for themselves: the National Oceanic and Atmospheric Administration (NOAA) and the Woods Hole Oceanographic Institution (WHOI) in the United States, the Canadian Department of Fisheries and Oceans (DFO), the Japan Agency for Marine-Earth Science and Technology (Jamstec), the State Oceanic Administration (SOA) in China, and so on.

European partnerships are essential to Ifremer's strategy. The future program Horizon Europe (2021-2027) has three pillars:

- Open science, with European Research Council (ERC) grants, Marie Skłodowska-Curie actions to encourage mobility, and support for research and innovation infrastructures
- Global challenges that the 17 UN Sustainable Development Goals seek to address for 2030
- Open innovation, within which marine and maritime subjects will have their niche, particularly so that the EU can benefit from "blue growth" projects and results that are part of the H2020 program.

Ifremer regularly provides the scientific background necessary for European or national agreements. The International Seabed Authority (ISA); the Scientific, Technical and Economic Committee for Fisheries (STECF) of the EU; and European Commission expert groups are some of the bodies that receive high-level international scientific consulting to inform French negotiations and stances.

## GIVE SCIENTIFIC AND STRATEGIC SUPPORT TO THE GOVERNMENT IN CREATING EUROPEAN AND INTERNATIONAL POLICIES AND STRATEGIES

Ifremer will continue this consulting work for the French government and will be particularly involved in negotiations of an implementation agreement for UNCLOS on the conservation and use of marine biodiversity (including genetic resources) in zones outside of national jurisdiction.

As part of the UN Decade of Ocean Science for Sustainable Development (2021-2030), which aims to help achieve SDG 14, Ifremer will work with the French government to create and promote national priorities that will be presented to the Intergovernmental Oceanographic Commission (IOC). Ifremer supports the development

of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and has nominated an expert who serves as co-president of the group responsible for sustainable exploitation of wild species.

This policy of strategic positioning will continue within the scope of the scientific priorities in the performance and objectives contract.

## ENSURE STRONG PARTICIPATION IN EUROPEAN AND INTERNATIONAL RESEARCH PROGRAMS

ACTION

31

This participation may occur through the H2020 national support and follow-up mechanism or through the future Horizon Europe program, as well as through the international bodies in which Ifremer plays a role either on its own behalf or as France's delegated representative. Within this context, Ifremer seeks to promote its scientific ambitions in proposals for projects and programs funded by European and international donors, such as Future Earth or the Belmont Forum, especially through its participation in the AllEnvi alliance. Given its limited means, Ifremer will analyze the impact of its influence (involvement in European and international bodies) to make the most of its role in the relevant entities.

Its involvement will be all the more useful due to its presence in regional coordination initiatives and will depend on the European Union's foreign policies. The sea basins that hold the most interest for Ifremer (Mediterranean, North and South Atlantic, Baltic Sea, North Sea and English Channel, Black Sea) are at the center of a dedicated European strategy. Ifremer will improve consistency among regional, national, European and international entities with its transversal approach and knowledge about all of these basins. It will thus have the opportunity to introduce its proposals for research topics into the actions resulting from European scientific strategies.

Beyond the objectives above, Ifremer will:

- Continue to develop its research infrastructures by internationalizing them and building scientific projects around them with European funding mechanisms
- Develop proposals for industry partnerships to participate in calls for tender within pillar 3 (EIC) of the future Horizon Europe program, especially in the fields of technology and MRE
- Invest in Horizon Europe programs to come and keep an eye out for decisions being made about the H2020 program's last calls for projects

## DEFINE AN INTERNATIONAL STRATEGY FOR THE INSTITUTE AROUND THREE MAIN PRIORITIES

### BUILDING A LIMITED NUMBER OF STRONG BILATERAL PARTNERSHIPS

Ifremer will pursue relationships with North American partners (United States, Canada) in the North Atlantic, as called for in the Galway statement. It will increase its coordination with German and British oceanographic institutes; in Germany, aside from its existing collaborations with Geomar, it will establish a strong partnership with the German institutes AWI and Marum, with which a call for shared projects was already initiated in 2017. It will build on maritime discussions between France and Japan, to strengthen its partnership with Jamstec.

Two other countries merit special attention:

- Ifremer will support France and Brazil in their joint effort to develop the partnership between their teams, though this partnership has little to no structure and little visibility. The Institute already plays a role in PIRATA (an IRD-led program that brings together Brazil, France and the United States), collecting oceanic and meteorological observation data in the tropical Atlantic. In parallel with this program, Ifremer has obtained authorization to perform surveys in Brazilian waters for marine geoscience projects with the company Petrobras. Over the past five years, new scientific areas for cooperation have emerged, particularly in aquaculture (with the government of Santa Catarina), biodiversity and the management of living resources (with French Guiana).
- China has also expressed the desire to form a bilateral partnership. Several geoscience projects and an associated international laboratory were created over the last years of the previous statement of objectives. However, the Institute would like to take the time to evaluate the possibility of expanding this cooperation.

### USING THE INSTITUTE'S OVERSEAS SITE POLICY TO CREATE AND CONSOLIDATE COOPERATIVE OPPORTUNITIES IN THE PACIFIC WITH AUSTRALIA AND NEW ZEALAND

**ACTION 33** For several years, Ifremer has been establishing cooperation: (i) in marine geoscience with its New Zealander counterparts, the NIWA (National Institute of Water and Atmospheric Research) and the GNS (New Zealand's leading provider of Earth, geoscience and isotope research), to study basins

around New Caledonia; (ii) in environmental science with the Cawthron Institute and the ESR (Institute of Environmental Science and Research) to study shellfish health.

Regarding Australia, the Ifremer Pacific Center is currently developing research on the genomic resources of pearl oysters with James Cook University (Townsville, QLD). Ifremer intends to strengthen this partnership both as a result of climate change and out of a desire to enhance scientific understanding in order to better support the management team at the Natural Park of the Coral Sea (PNMC) in the New Caledonian EEZ.

These projects with Australia will take shape at the French Polynesia site.

### INTERNATIONALIZING IFREMER AND DEVELOPING STAFF MOBILITY

Ifremer wishes to make its workforce more international. The Institute will craft human resources initiatives to this end in collaboration with various national and international partners. Internationalization can be achieved by making it easier to host graduate students and post-grads and easier to hire young or senior researchers, from within or outside of Europe. Within the context of bilateral agreements with special partners (NOAA, Marum, etc.), researcher exchanges could be expanded to kick-start research on some of the high-priority issues in this statement of objectives, as is currently being done with a two-year contract for a visiting economics researcher at NOAA.

#### ACTION 34

In the same vein, applications for ERC grants and the Marie Skłodowska-Curie actions are strongly encouraged. A three-component strategy "Inciter, Accompagner, Influencer" (Foster, Support, Influence) will be deployed for ERC and Marie Skłodowska-Curie actions candidates. This strategy has several phases:

- (I) communication about the ERC program and the stimulus mechanisms that promote scientific independence, team recruitment and administrative flexibility
- (II) a pre-selection phase following a clear procedure that candidates are informed of in advance
- (III) an individual support phase: creation of a proposal and a team, preparation of oral presentations, etc.
- (IV) entering into contracts with the winners.

# OBJECTIVE 6

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## **Improve the Institute's management and its use of resources de ses ressources**

The complexity of the Institute's surrounding context calls for firm leadership. It combines comprehensive tracking of various projects, with summaries of their progress and costs, along with decision-making procedures based on regularly updated priorities, while taking into account the teams' capacity for initiative and the underlying administrative workload. This type of guidance requires clear functional pathways and high-quality administrative support.

## ENSURE BETTER ADMINISTRATION

### BY ADAPTING THE INSTITUTE'S MANAGEMENT AND PLANNING METHODS TO THE RESEARCH TEAMS' NEEDS

One major financial challenge for the Institute is creating “wobble room” in the budget for teams by managing resources efficiently and consolidating decision-making and arbitrage methods into a collective framework. The subjects with the most financial impact over the next statement term will be the following:

- fleet: a sustainable model must be achieved and investments must be made
- real estate holdings: to be upgraded, and the future multiyear real estate strategy (SPSI) must be prepared
- renewal of large scientific equipment<sup>13</sup>
- fostering science and innovation<sup>14</sup>
- reduction of payroll costs
- changes in project funding rates; the issue of eligible costs
- cash management
- searching for external resources

In 2017, along with the roll-out of a new management information system for purchases, accounting, travel and management tools, a new directorate was created to oversee financial and legal policy and security for the Institute. It was designed to improve handling of the Institute's financial processes and provide better service to teams. During this statement term, the following steps will occur:

- Finalization of the directorate's organization
- Continued rollout of the management information system with a view to:

13. Renewal of scientific equipment: for the research teams' benefit, Ifremer must implement a multiyear equipment renewal plan, develop partnerships to share access to this equipment (where the geographic diversity policies permit it), and adopt a firm policy of seeking cofinancing for this equipment (either refurbishment or new equipment).

14. Encouragement for innovation and research: in order to give research and technology teams the ability to pursue innovative and risky projects without always needing to seek external funding, a portion of the Institute's resources and working capital will be allocated to these activities.

#### ACTION 35

- Improving the reliability of annual closing procedures as follows:
  - Design and implement capital asset management procedures by the 2019 deadline, aiming for full operability by 2021.
  - Design and implement management tools for the Institute's activities, based on a reliable information center (2021). The goal is to devise a set of indicators in 2019 (budget and financial reporting for project or structure managers as well as upper management), to be operational in 2021.
- Continuing to adopt GBCP and the cultural changes it requires

#### ACTION 36

- Implementing multiyear budgeting capacity: this will be necessary from the first draft of a project up to financial completion of the project. The administrative and financial aspects of every project will thus be taken into account from the beginning so that they can be monitored throughout the project lifecycle and so that there will be a reliable database for budgets and/or financial planning to use. This process will also make it possible to create and apply project selection criteria in line with the Institute's strategic and financial priorities. This process will be operational in 2021.

#### ACTION 37

- Introduction of structured internal monitoring and launch of a protocol for interactions between the DAJF (administrative, legal and financial directorate) and the accounting agency; these will be essential complements to the new management tool and the new organization system. Internal monitoring will be based on the quality processes currently used at the Institute, including that of the DAJF. The expected improvements are:

- An increase in administrative productivity, via updating non-redundant monitoring procedures
- A detailed description of the roles and responsibilities of each structure for accounting operations. (The new tool has modified the processes and the new organizational system has changed the responsibilities.)

- Establishment of an action plan for the purchasing process to improve administrative productivity. This action plan will enter into force in 2019 and will be based on:

- A systematic search for automated processes through the adoption of the Chorus Pro portal to increase the number of provider-invoice-

related processes that can be automated. Aside from speeding up invoice processing (30 days maximum), this will decrease outsourcing of invoice processing and should solve many problems with document archiving and tracking;

- o A systematic effort to streamline purchasing by grouping together identical purchases by supplier, which requires a national purchasing policy, and when possible, contacting public group-purchasing operations. These practices will be adopted progressively as contracts are signed.

Furthermore, rolling out the new management tool is part of a continuous improvement process for adapting to future regulatory changes, boosting operational effectiveness and giving scientific teams the added value expected from a more flexible management system.

## ACTION

38

Ifremer will participate in the harmonization of MESRI research operators' information systems and will conduct a study of the impact of AMUE's tool development for MESRI on tools developed by Ifremer. Ifremer will, in turn, inform AMUE about any points specific to public industrial and commercial establishments.

## ACTION

39

Additionally, Ifremer will continue monitoring its ratio of administrative staff to operational staff (scientific and technical) and will compare it to similar organizations' situations.

## PROMOTE A CAREER MANAGEMENT POLICY THAT PLACES SKILLS AT THE FOREFRONT TO ACCOMPLISH SCIENTIFIC AND TECHNICAL PRIORITIES

The parallel tracks of research and expert consulting, within structured networks and with an organization-driven view of the whole, have led to the accumulation of a wealth of skills and knowledge. Maintaining and appropriately evaluating this potential is one of the Institute's chief duties.

This issue is even more important given that close to a third of the Institute's workforce will retire in the next ten years. The stores of knowledge that allow dialogue with actors in the maritime world must be preserved, and future talent must be considered according to its suitability for the evolution of marine sciences and the Institute's scientific and technological mission.

Ifremer needs, first and foremost, the scientific and technological skills that will enable it to update its scientific practices in the spirit of openness to society, awareness of its role in the blue economy, and adaptation to the fields of expertise necessary to provide support for public authorities and innovation.

## ACTION

40

The Institute's actions will include creating a map of the existing and necessary skills, maintaining and increasing the Institute's appeal (nationally and internationally) to attract the best researchers and engineers, continuing a policy that promotes training and creating opportunities for cooperation and staff involvement.

Ifremer will seek a way to improve the appeal of managerial positions to combat a lack of enthusiasm for management/organization-related roles that staff find unattractive.

## ENGAGE IN MORE COMPREHENSIVE DIALOGUE WITH EMPLOYEES

Ifremer's upper management will commit to fostering labor relations dialogue within the Institute. It has not yet been possible to ensure compliance with some collective agreements, in particular because of the headquarters relocation, which destabilized core offices due to departures (staff anticipating the transfer) and general disorganization (staff concerns).

Improving internal functioning was a major concern in the previous statement of objectives, and yet the Institute's overall effectiveness was markedly affected, with significant delays for certain projects.

Thus, it remains a priority to update the employment agreement and the provisions related to the duration of work.

### ACTION

41

Furthermore, the Institute will review the provisions related to stronger collective negotiation. The functioning of employee representative bodies must be the subject of new agreements and elections within the Institute in order to comply with provisions related to the new organization of labor relations.

As a stakeholder in a broad movement that affects the whole world of work, the Institute will reflect and conduct negotiations on a work-from-home policy.

The modernization of the salary policy, which began in 2016, will continue with work on a variable-remuneration mechanism, such as an incentive scheme, along with an employee savings plan. To move forward, it will be necessary to find points of consensus with the parties engaged in these negotiations and identify performance indicators that make sense for the teams, all while making sure to account for the budgetary viability of the decisions made.

Additionally, Ifremer will commit to a determined action plan for workers with disabilities. It will involve recruiting, partnerships and internal work on awareness-raising.

## CONTINUE TO MODERNIZE HR TOOLS AND MAKE HR PROCESSES MORE SECURE

The tool HRAccess, rolled out during the term of the previous statement of objectives, will be used more fully, and, at the same time, HR processes will be documented in procedure form.

## CONSOLIDATE IFREMER'S QUALITY MANAGEMENT SYSTEM

Ifremer will continue to consolidate its quality management system by turning it into a central tool that can be used to improve internal processes. These are the top priorities:

- Maintaining the Institute's ISO 9001 certifications and ISO 17025 laboratory accreditations
- Adapting the Ifremer quality system to the Institute's organizational changes in compliance with the regulatory framework and the growing maturity of the quality management system, which has been supported by recognition of management-related risks and by the involvement of employees
- Creating a quality system specific to laboratories with ISO 17025 accreditation, with centralized management of the quality system's orientations and budget
- Defining indicators specific to the Institute's three missions, to maintain consistency over several performance and objectives contracts

## STRENGTHEN POLICIES RELATED TO CONDUCT, SCIENTIFIC INTEGRITY AND ETHICS

As mentioned in the introduction to this document, the Institute's activity is multifarious: research, innovation in step with the business world, and advice for public policy.

Approaching all ocean-related issues through this triad is the mark of an institution that strives to be ever more engaged with broader society. The essential exemplarity evoked in the introduction manifests through stronger ethics policies, which ensure the rigor and integrity of scientific work and the careful study of ethical issues raised by the Institute's activities. This is a necessary condition for a relationship of trust between the Institute and broader society.

## IMPLEMENT A SUSTAINABILITY AND CORPORATE SOCIAL RESPONSIBILITY POLICY

### ACTION 42

Since the creation of the previous statement of objectives, the SD-CSR and OSR (organizations' social responsibility) situation has changed drastically. These issues have taken center stage at companies and in the minds of the general public because of several major events (Paris Climate Conference in 2015, Marrakesh Climate Conference in 2016). It follows that Ifremer must invest more in SD-CSR so that it is perceived and recognized as an exemplary public actor, and so that it can contribute to the government's commitments.

An SD-CSR policy must be formally established in order to create a list of the goals sought, the desired governance system, and the ways to measure and verify progress.

The Environmental Management approach will be designed to integrate with the Quality Management System to be maximally effective and ensure the widest possible adoption by staff. Over the next two years, it will be necessary to create a process map, designate supervisors, and define relevant objectives and indicators.

To ensure that the roll-out will be internally consistent and transversal, upper management at the Institute will oversee the CSR-SD-OSR movement.

## COMMUNICATE BETTER TO BE MORE IN TUNE WITH THE GENERAL PUBLIC

Situating the Institute's foundational triad in the dialogue between science and society makes it clear what communication actions must be undertaken. Four main objectives have been defined:

- opening and strengthening dialogue with the general public
- creating an open science policy
- strengthening the scientific mediation capacity of the Institute to promote science and technology
- promoting Ifremer as the leading institution for marine sciences in France

### OPENING AND STRENGTHENING DIALOGUE WITH THE GENERAL PUBLIC

This point was brought up in discussion of the objective "Consolidate scientific knowledge and develop expertise to inform public policy".

Improving dialogue with the general public also means communicating differently about the scientific method, in a way that does not omit the part played by questions and doubt. For sensitive and complex subjects, it will be necessary to create standard phrasings that sum up the Institute's view and stance on a topic. This communication channel thus presents the opportunity for the Institute to self-investigate more comprehensively on various topics. Participating in public debate also means providing scientific and factual clarifying information that enables citizens to increase their knowledge.

### CREATING AN OPEN SCIENCE POLICY

#### ACTION 43

Open science is the free dissemination of research publications and data.

It is possible due to the digital transition, which represents an excellent opportunity to develop open access to research publications and data. Open science will bring publicly funded research out from the insular world of closed databases and reduce duplicated efforts in the collection, creation, transfer and reuse of scientific material, which will increase research efficiency.

Open science aims to build an ecosystem in which science is more cumulative, more solidly backed up by data, more transparent, faster and more accessible. It facilitates the democratization of access to knowledge that is useful for research, training, the economy and society. As a driving force for scientific

integrity that also encourages the population's trust in science, open science represents a new phase of progress for society and aligns fully with Ifremer's vision of its interactions with the general public.

Ifremer will create its open science policy by taking inspiration from national (CoSO), European and international precedents.

#### **STRENGTHENING THE SCIENTIFIC MEDIATION CAPACITY OF THE INSTITUTE TO PROMOTE SCIENCE AND TECHNOLOGY**

As part of the previous contract, many important partnerships were created, mainly with aquariums and scientific and technological culture centers. Over the next five years, it makes sense to continue these collaborations with scientific and technological culture networks on the basis of the National Strategy for Scientific, Technological and Industrial Culture (SNCSTI), which establishes a common ambition: "Providing information to our fellow citizens through our scientific accomplishments and the scientific process, and giving them the means to develop and strengthen their curiosity, their openmindedness, and their critical minds, and the means to reject simplistic and reductionistic ways of thinking".

Ifremer must be proactive in performing outreach concerning its core topics by developing collaborations with the educational sphere (pedagogical material) and the cultural sphere (art-science material), especially to reach new targets (audiences without access to science or who mistrust science). Strengthening these outreach mechanisms could be part of the implementation of a network of science mediators, whose work would be valued.

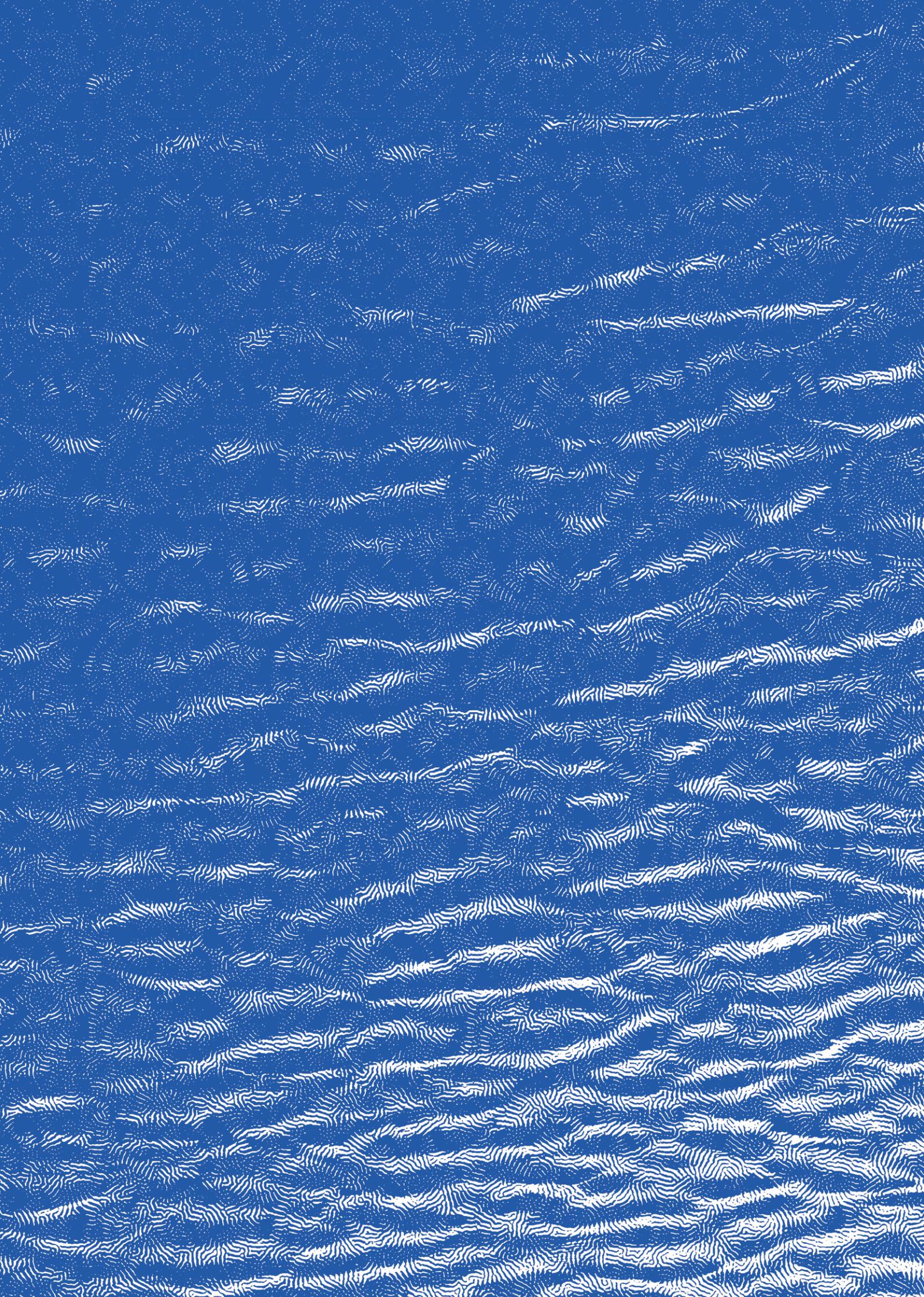
#### **PROMOTING IFREMER AS THE LEADING INSTITUTION FOR MARINE SCIENCES IN FRANCE**

All communication actions should make clear the Institute's uniqueness, as well as its special place in the marine sciences landscape in France.

The institutional website for Ifremer should better reflect the Institute's renewed ambitions and, in a balanced way, the three components of the triad. It should provide more content for the general public and become more of a knowledge base.

Promoting the Institute as the leading institute for marine sciences and technology in France also requires a promotion and communication strategy, including participation in big events and partnerships with other institutes or actors. This communication strategy should make better use of social networks and the opportunities they offer in terms of audience participation.

Bolstering recognition of the Institute in the outside world, by showcasing all of the projects it leads, should also strengthen internal cohesion with regard to the headquarters relocation to Brest and the adjustment of the Institute's strategic priorities.



# CONTRACT ACTIONS

The actions listed below are key steps that the French government and Ifremer have both committed to in this contract<sup>15</sup>. They do not represent the entirety of the Institute's activity, which is covered in a report presented at regular intervals to the Ifremer board.

15. Where several dates are indicated for a single action, this refers to different stages of that action (e.g. definition of a strategy, then implementation).

<b>OBJECTIVE 1</b>		
Understand and predict ocean evolution through 2100	<p><b>ACTION 1</b> Discuss how to pool marine geosciences expertise and create a mixed research unit in Brest (2019) . . . . . <b>2019</b></p> <p><b>ACTION 2</b> Create a research team at the Montpellier-Sète site that focuses on evolution and works with local and national actors . . . . . <b>2020</b></p> <p><b>ACTION 3</b> Set up an integrated multidisciplinary microbiology observatory . . . . . <b>2019</b></p> <p><b>ACTION 4</b> Begin transversal brainstorming on multi-scale modeling . . . . . <b>2019</b></p> <p><b>ACTION 5</b> Develop field capacities for nucleic acid detection (DNA and RNA) . . . . . <b>2021</b></p> <p><b>ACTION 6</b> Reconsider the thematic organization of the Institute given its updated strategic plan . . . . . <b>2020</b></p> <p><b>ACTION 7</b> List and describe Ifremer's different activities and modes of action as a leading institute for marine sciences and technology . . . . . <b>2019</b></p> <p><b>ACTION 8</b> Increase infrastructure internationalization and improve service provided to the scientific community . . . . . <b>2021, 2023</b></p> <p><b>ACTION 9</b> Develop Ifremer's influence at the Brittany, Pays de Loire and Occitanie sites through a judicious UMR-creation policy and joint actions . . . . . <b>2019, 2021</b></p> <p><b>ACTION 10</b> Enhance interactions with other local actors in the form of federations or officially recognized teams . . . . . <b>2019, 2021</b></p> <p><b>ACTION 11</b> Maintain potential in overseas France, interact with ESR partners who are present at those sites, develop the Ifremer Pacific Center's strategic role in the international landscape . . . . . <b>2019, 2022</b></p>	
<b>OBJECTIVE 2</b>		
Consolidate scientific knowledge and develop expertise to inform public policy	<p><b>ACTION 12</b> Produce and sign roadmaps that central government entities and Ifremer agree on . . . . . <b>2019</b></p> <p><b>ACTION 13</b> Sign the charter promising openness to the general public . . . . . <b>2019</b></p> <p><b>ACTION 14</b> Identify the particularities of missions requiring expertise/advice for public policy to integrate them into a global GPEC framework for the Institute . . . . . <b>2019</b></p> <p><b>ACTION 15</b> Implement a single unified quality system for the seven laboratories in charge of monitoring networks. . . . . <b>2021</b></p> <p><b>ACTION 16</b> Support the French government in setting up a long-term and adaptable organizational system for the Antilles-Guiana SIH . . . . . <b>2022</b></p> <p><b>ACTION 17</b> Help the French government perform its 2024 evaluation of marine waters (by supporting implementation of the MSFD and the MSPD) . . . . . <b>2022</b></p>	

<b>OBJECTIVE 3</b>			
An innovative organization driving the development of the maritime economy	<b>ACTION 18</b>	Change career evaluation and recruiting methods to put more emphasis on innovation-related skills and accomplishments	2021
	<b>ACTION 19</b>	Produce a development plan for open innovation activities: hosting collaborative projects, private companies, start-ups, and entrepreneurs	2020
	<b>ACTION 20</b>	Produce documents on the Institute's spin-off and intellectual property policies	2020
	<b>ACTION 21</b>	Produce a strategy for collaboration with SATTs to increase maturity potential	2020, 2021
	<b>ACTION 22</b>	Detail how the Institute will adopt the InOcean initiative and monitor its progress	2019
<b>OBJECTIVE 4</b>			
Get the most out of a unified fleet that serves all users, by preparing and implementing a multiyear plan to upgrade ships and vehicles	<b>ACTION 23</b>	Produce a medium-term plan, to be reviewed every two years, for five years of operations and ten years of investment	2019
	<b>ACTION 24</b>	Give the fleet the flexibility now expected of it since its unification	2021
	<b>ACTION 25</b>	Establish the structure succeeding Genavir and ensure that it accomplishes its assigned goals	2020, 2023
	<b>ACTION 26</b>	Monitor the performance of the structure succeeding Genavir	2021
	<b>ACTION 27</b>	Contribute to a new position statement from the European Marine Board	2019
	<b>ACTION 28</b>	Ensure the proper adjustment and adaptation of skills within the DFO	2020
	<b>ACTION 29</b>	Produce a communication plan for the Fleet TGIR	2020
	<b>ACTION 30</b>	Set goals for renewal of the infrastructure	2019, 2021, 2023
<b>OBJECTIVE 5</b>			
A high-profile institute recognized worldwide	<b>ACTION 31</b>	Analyze the impact of Ifremer's participation in European and international bodies	2021
	<b>ACTION 32</b>	Establish strong partnerships with Germany and Japan	2019
	<b>ACTION 33</b>	Create and reinforce cooperative relationships in the Pacific, especially in Oceania (Australia, New Zealand)	2020
	<b>ACTION 34</b>	Develop a strategy for supporting candidates for ERC grants and the Marie Skłodowska-Curie actions	2019
<b>OBJECTIVE 6</b>			
Improve the Institute's administration and its use of resources	<b>ACTION 35</b>	Improve the reliability of annual closing procedures	2019, 2021
	<b>ACTION 36</b>	Create a process for multiyear budget planning	2021
	<b>ACTION 37</b>	Create and then implement an internal monitoring strategy	2019, 2021
	<b>ACTION 38</b>	Perform an impact study of AMUE's tool development for MESRI on tools developed by Ifremer	2020
	<b>ACTION 39</b>	Administrative/scientific staff ratio: draw up Ifremer's statistics and compare them with those of similar actors, and create an action plan to promote jobs in science	2019, 2020
	<b>ACTION 40</b>	Create a map of existing and necessary skills for the establishment of GPEC	2020
	<b>ACTION 41</b>	Update the employment agreement	2020, 2021
	<b>ACTION 42</b>	Create a SD-CSR policy and an environmental management system	2020, 2021
	<b>ACTION 43</b>	Define an open science policy	2020

## STATEMENT INDICATORS

The statement indicators help measure the extent to which statement objectives have been attained. A summary of these indicators will be included in the annual report on progress toward these objectives. Internal indicators for the use of the Institute's directors have also been established as part of the quality management system. Ifremer will be able to present these internal indicators as requested in order to substantiate the annual progress report.

Objectives	Indicators	Target by the end of 2023 (unless otherwise indicated)	2018 reference value (unless otherwise indicated)	Notes
<b>OBJECTIVE 1</b> Understand and predict ocean evolution through 2100:	<b>1</b>	<b>a.</b> Number of Tier A publications by Ifremer <b>b.</b> Number of Tier A publications by Ifremer in the areas of "marine biology/ecology" and "physics/oceanography"	<b>a.</b> 512 publications <b>b.</b> Not applicable	2017 reference value
	<b>2</b>	<b>a.</b> Number of doctoral students and post-docs (including foreigners) supervised or co-supervised by Ifremer scientists <b>b.</b> Percentage of external funding (doctoral students and post-docs). <b>c.</b> Number of HDR diploma holders (persons certified to direct research)	<b>a.</b> Increasing (total number and proportion of foreigners) <b>b.</b> Increasing <b>c.</b> Increasing	<b>a.</b> 219 doctoral students (58 foreign) and 44 post-docs (20 foreign) <b>b.</b> 99% (doctoral students) and 91% (post-docs) <b>c.</b> 90 HDR diploma holders
<b>OBJECTIVE 2</b> Consolidate scientific knowledge and develop expertise to inform public policy	<b>3</b>	Number of publications connected to ESR partners, by site valence: Brittany, Pays de la Loire, Occitanie-PACA	Increasing each year 209 publications - Brittany: 144 - Occitanie-PACA: 49 - Pays de la Loire: 16	2017 reference values
	<b>4</b>	Number of open access publications	Increasing each year Not applicable	Indicator to be defined as part of Ifremer's open science policy
<b>OBJECTIVE 2</b> Consolidate scientific knowledge and develop expertise to inform public policy	<b>5</b>	Satisfaction of information requester	100 %	100 %
	<b>6</b>	Financial coverage of activities providing information for public policy	80% of total costs for expertise/monitoring activities, 50% of total costs for shared-interest activities	In recent years, funds from the EMFF have been collected on a delayed schedule; this delay makes it impossible to establish a relevant reference value.

<b>OBJECTIVE 3</b> An innovative organization driving the development of the maritime economy	<b>7</b>	<b>a.</b> Annual number of invention disclosures <b>b.</b> Number of invention disclosures related to the Focus Innovation workshops	Increasing each year	2	invention disclosures	
	<b>8</b>	<b>a.</b> Number of industry actors benefiting from knowledge shared by the Institute <b>b.</b> Income from private sources	<b>a.</b> Increasing <b>b.</b> 10% of the Institute's budget and increasing each year	<b>a.</b> 68 industry actors <b>b.</b> €7 M	2017 reference values	
	<b>9</b>	Number of mature projects connected to Ifremer and total value of these projects	Increasing	Not applicable	Indicator to be defined	
<b>OBJECTIVE 4</b> Get the most out of a unified fleet that serves all users	<b>10</b>	Number of days of scientific activity for deep-sea vessels in the Fleet TGIR	450 days	450 days		
	<b>11</b>	Number of days of scientific activity for coastal and overseas vessels in the Fleet TGIR	960 days	960 days		
<b>OBJECTIVE 5</b> A high-profile institute recognized across Europe and around the world	<b>12</b>	Rate of return on responses to the Horizon 2020 calls for tender	Greater than 1	1.23	Provisional 2018 reference value	
	<b>13</b>	<b>a.</b> Persons involved in Marie Skłodowska-Curie projects <b>b.</b> Number of ERC grants won	<b>a.</b> Increasing <b>b.</b> 5 over the statement term	<b>a.</b> 0 <b>b.</b> 1		
<b>OBJECTIVE 6</b> Improve the Institute's administration and its use of resources	<b>14</b>	Number of foreigners employed by Ifremer	Increasing	62 people	2017 reference value	
	<b>15</b>	Payment time frames	30 days	60 days	Due to the implementation of a new information system (SAP), this time frame was 112 days in 2018	
	<b>16</b>	Gaps between predicted and actual project funding	Decreasing	Not applicable	Data will be collected starting in 2019.	
	<b>17</b>	Effectiveness of purchase organization	1000 orders per FTE	915 orders per FTE		
	<b>18</b>	Percentage of internal applications for management positions	Increasing	0,73%		
	<b>19</b>	Percentage of workers with disabilities in the workforce	Aiming for 6%	3,17 %	2017 reference value	

## SCIENTIFIC PRIORITIES AND SUSTAINABLE DEVELOPMENT GOALS

<p><b>KNOWLEDGE GAPS TO FILL<sup>16</sup> FOR THE IMPLEMENTATION OF SDG 14</b>            "Conserve and sustainably use the oceans, seas and marine resources for sustainable development" in interaction with SDG 1, 8, 11, 12 and 13.</p>	<p><b>MAIN SCIENTIFIC PRIORITIES AND QUESTIONS FOR IFREMER</b></p>
<p><b>SDG 14 AND SDG 1 – NO POVERTY</b> </p> <p>Societal/economic value of the oceans, ecosystem services and risk analysis (as related to extractive industries)</p> <p>Possibility of keeping fish stocks at biologically viable levels by limiting fishing activity while ensuring its profitability</p>	<p><b>Understanding the dynamics of how biodiversity and ecosystems respond to climate change:</b> understanding the dynamics of cumulative impacts through new evaluation methods</p> <p><b>Creating a scientific approach to support for adaptive management of marine and coastal social-ecological systems:</b> co-creating multidisciplinary programming to provide support for adaptive management</p>
<p><b>SDG 14 AND SDG 8 – DECENT WORK AND ECONOMIC GROWTH</b> </p> <p>How marine ecosystem services are related to economic and social growth in concrete terms and how this changes over time</p> <p>How to minimize the negative effects of economic and social development on marine ecosystems</p> <p>Potential for sustainable blue growth in marine regions, sea basins and countries</p> <p>Value of ecosystem services (especially non-market services) and how to integrate monetized and non-monetizable values for policy analysis.</p>	<p><b>Creating a scientific approach to support for adaptive management of marine and coastal social-ecological systems:</b> co-creating multidisciplinary programming to provide support for adaptive management</p> <p><b>Understanding interactions at the ocean-lithosphere interface:</b> observing and understanding interactions at the ocean-lithosphere interface</p> <p><b>Adaptive management of marine social-ecological systems:</b> co-creating multidisciplinary programming to provide support for adaptive management</p> <p><b>Understanding and predicting the evolution of marine organisms within the context of climate change:</b></p> <ul style="list-style-type: none"> <li>• assessing the contribution of population genomics to ecology</li> <li>• identifying new marine bio-resources</li> </ul> <p><b>Creating a scientific approach to support for the adaptive management of marine and coastal social-ecological systems:</b> co-creating multidisciplinary programming to provide support for adaptive management</p>

16. ICSU analysis available at <https://council.sciencepublications/a-guide-to-sdg-interactions-from-science-to-implementation>

## SDG 14 AND SDG 11 SUSTAINABLE CITIES AND COMMUNITIES



How the increase in coastal development, urbanization and coastal environments interact and mutually influence each other

**Understanding the dynamics of how biodiversity and ecosystems respond to climate change:** understanding the dynamics of cumulative impacts through new evaluation methods

How city and regional planning fiscal policies influence the coastal environment and vice versa, and how to develop integrated cross-border governance (for example, across the land-sea boundary), including administrative borders and jurisdictions

**Creating a scientific approach to support for adaptive management of marine and coastal social-ecological systems:** co-creating multidisciplinary programming to provide support for adaptive management

Gaps, particularly in developing countries, in the capacities that would ensure sustainable planning of human establishments and regional development

**Creating a scientific approach to support for adaptive management of marine and coastal social-ecological systems:** co-creating multidisciplinary programming to provide support for adaptive management

## SDG 14 AND SDG 12 – RESPONSIBLE CONSUMPTION AND PRODUCTION



State of stocks and fisheries, including the rejection level and the way they should be managed to ensure the sustainable maximum yield

**Understanding the dynamics of how biodiversity and ecosystems respond to climate change:** evaluating resilience and anticipating state shifts—tipping points for social-ecological systems and the biodiversity associated with different levels of organization

How aquaculture affects marine systems in specific contexts, specifically regarding chemical and nutrient input in the marine environment and the effects on wild fish stocks and how these effects can be diminished

**Understanding the dynamics of how biodiversity and ecosystems respond to climate change:** evaluating resilience and anticipating state shifts—tipping points for social-ecological systems and the biodiversity associated with different levels of organization

How human health is affected by microplastics in marine ecosystems

**Understanding the dynamics of how biodiversity and ecosystems respond to climate change:** understanding the dynamics of cumulative impacts through new evaluation methods

## SDG 14 AND SDG 13 – MEASURES RELATED TO THE FIGHT AGAINST CLIMATE CHANGE



Long-term effects and impacts of climate change, within the framework of the Paris Agreement, on the oceans, seas, coasts and their ecosystems

**Ocean evolution through 2100, via an understanding of its dynamic and impacts:** integrating ocean observation, modeling and evolutionary processes on decadal to centennial timescales to fine-tune predictions

**Understanding climatological and geological events through a multi-scale approach and data from multiple sources:**

- understanding and predicting the genesis of extreme maritime weather events
- understanding and predicting underwater events

**Understanding and predicting the evolution of marine organisms within the context of climate change:** identifying life forms' evolutionary and adaptive mechanisms

What impact does climate change have on the health of marine ecosystems, habitats, and species in low-income countries, and how can this impact be weakened or reduced?

**Understanding the dynamics of how biodiversity and ecosystems respond to climate change:** understanding the dynamics of cumulative impacts through new evaluation methods

**Understanding climatological and geological events through a multi-scale approach and data from multiple sources:** understanding and modeling unusual climate events and their impact on ecosystems

Are marine and coastal ecosystems resilient in the face of climate change? What conservation and management measures are appropriate and effective in weakening the effects of climate change, adapting to nature and reversing harmful processes like coral bleaching?

**Understanding the dynamics of how biodiversity and ecosystems respond to climate change:**

- describing sedimentary habitats in the context of climate change
- evaluating the future of coastal ecosystems in the context of climate change
- understanding the dynamics of cumulative impacts through new evaluation methods
- identifying the effects of interactions between functional groups on the dynamics of exploited ecosystems

The influence of climate change on fish stocks

**Understanding the dynamics of how biodiversity and ecosystems respond to climate change:** evaluating resilience and anticipating state shifts—tipping points for social-ecological systems and the biodiversity associated with different levels of organization

## GLOSSAIRE

<b>ISA</b>	International Seabed Authority	<b>CRIOBE</b>	Centre de Recherches Insulaires et Observatoire de l'Environnement (Centre for Island Research and Environmental Observatory)
<b>AMI</b>	Appel à Manifestation d'Intérêt (Call for expressions of interest)	<b>STECF</b>	Scientific, Technical and Economic Committee for Fisheries
<b>AMURE</b>	Aménagements, Usages des Ressources de l'Environnement (Environmental Resource Planning and Uses)	<b>DAJF</b>	Direction Administrative, Juridique et Financière (Administrative, Legal and Financial Directorate)
<b>ANSES</b>	Agence Nationale de Sécurité Sanitaire de l'alimentation, de l'environnement et du travail (National Agency for Food, Environmental and Occupational Health and Safety)	<b>WFD</b>	Water Framework Directive
<b>AUV</b>	Autonomous Underwater Vehicle	<b>MSPD</b>	Maritime Spatial Planning Directive
<b>BLP</b>	Bibliothèque La Pérouse	<b>MSFD</b>	Marine Strategy Framework Directive
<b>BRGM</b>	Bureau de Recherches Géologiques et Minières (Bureau of Geological and Mining Research)	<b>SD-CSR</b>	Sustainable development – corporate social responsibility
<b>CCSTI</b>	Centre de Culture Scientifique, Technique, Industrielle (Center for Scientific, Technical and Industrial Culture)	<b>DEB</b>	Direction de l'Eau et la Biodiversité (Directorate for Water and Biodiversity)
<b>CEMEB</b>	Centre Méditerranéen Environnement et Biodiversité (Mediterranean Center for Environment and Biodiversity)	<b>DGAL</b>	Direction générale de l'Alimentation (Directorate General for Food)
<b>CETSM</b>	Centre Européen de Technologies Sous-Marines (European Center for Underwater Technologies)	<b>DGEC</b>	Direction générale de l'énergie et du climat (General Directorate of Energy and Climate)
<b>CIP</b>	Centre Ifremer du Pacifique (Ifremer Pacific Center)	<b>DFO</b>	Direction de la Flotte Océanographique (Oceanographic Fleet Directorate)
<b>CNFC</b>	Commission Nationale Flotte Côtière (National Coastal Fleet Commission)	<b>DHFF-DO</b>	Directive Habitat Faune Flore – Directive Oiseaux (Fauna, Flora and Habitats Directive – Birds Directive)
<b>CNFH</b>	Commission Nationale Flotte Hauturière (National Open-Sea Fleet)	<b>DROM-COM</b>	Départements et Régions et Collectivités d'Outre-Mer (French Overseas Departments, Regions and Collectivities; overseas France)
<b>CNRS</b>	Centre National de la Recherche Scientifique (National Center for Scientific Research)	<b>DPMA</b>	Direction des Pêches Maritimes et de l'Aquaculture (Directorate for Sea Fisheries and Aquaculture)
<b>IOC</b>	Intergovernmental Oceanographic Commission	<b>EDSML</b>	École Doctorale Sciences de la Mer et du Littoral (Graduate School for Ocean and Coastal Sciences)
<b>COP</b>	Conference of the Parties	<b>EIO</b>	Environnement Insulaire Océanien (Oceanic Island Environments)
<b>CoSO</b>	Comité pour la science ouverte (Committee for Open Science)	<b>EMB</b>	European Marine Board
<b>CRESICA</b>	Consortium de Recherche, d'Enseignement Supérieur et d'Innovation de Nouvelle-Calédonie (Consortium for Cooperation for Research, Higher Education and Innovation in New Caledonia)	<b>MRE</b>	Marine Renewable Energies
		<b>EMSO</b>	European Multidisciplinary Seafloor and water column Observatory
		<b>ENTROPIE</b>	Écologie Marine Tropicale des Océans Pacifique et Indien (Tropical Marine Ecology of the Pacific and Indian Oceans)

<b>ERC</b>	European Research Council	<b>IRSN</b>	Institut de Radioprotection et de Sûreté Nucléaire (Institute for Radiation Protection and Nuclear Safety)
<b>ETI</b>	Entreprise de Taille Intermédiaire (Intermediate-Sized Business)	<b>IUML</b>	Institut Universitaire de la Mer
<b>EUR</b>	École Universitaire de Recherche (University Research Center)	<b>I-SITE</b>	Initiatives-Science-Innovation-Territoire-Économie (Initiatives for Science, Innovation, Territories and Economy)
<b>EUROFLEETS</b>	European infrastructure project aiming to integrate and coordinate European research fleets; an international network of independent profiling floats	<b>ILICO</b>	Infrastructure de recherche littorale et côtière (Infrastructure for Littoral and Coastal Research)
<b>EUROARGO</b>	European Contribution to the ARGO Program	<b>JAMSTEC</b>	Japan Agency for Marine-Earth Science and Technology
<b>FOF</b>	Flotte Océanographique Française (French Oceanographic Fleet)	<b>JERICO-NEXT</b>	Joint European Research Infrastructure
<b>GBCP</b>	Gestion Budgétaire et Comptable Publique (Public management of accounts and budgets)	<b>LABEX</b>	Laboratoire d'Excellence (Laboratory of Excellence)
<b>Genavir</b>	French economic interest group for the management of research vessels	<b>LEEISA</b>	Laboratoire Écologie, Evolution, Interactions des Systèmes Amazoniens (Laboratory for the Ecology, Evolution and Interactions of Amazonian Systems)
<b>GIE</b>	Groupement d'Intérêt Économique (Economic Interest Group)	<b>LEMAR</b>	Laboratoire des Sciences de l'Environnement Marin (Laboratory for Marine Environmental Sciences)
<b>IPCC</b>	Intergovernmental Panel on Climate Change	<b>LM2E</b>	Laboratoire de Microbiologie des Environnements Extrêmes (Laboratory for the Microbiology of Extreme Environments)
<b>GIS</b>	Groupement d'Intérêt Scientifique (Scientific Interest Group)	<b>LOPS</b>	Laboratoire d'Océanographie Physique et Spatiale (Laboratory for Physical and Spatial Oceanography)
<b>GPEC</b>	Gestion Prévisionnelle des Emplois et des Compétences (Forward-looking management of jobs and skills)	<b>MARBEC</b>	Marine Biodiversity, Exploitation and Conservation
<b>Hcéres</b>	Haut Conseil de l'évaluation de la recherche et de l'enseignement supérieur (High Council for Evaluation of Research and Higher Education)	<b>MARINERG-I</b>	European research infrastructure for the development of marine renewable energies
<b>HROV</b>	Hybrid ROV	<b>MEAE</b>	Ministère de l'Europe et des affaires étrangères (Ministry of Europe and Foreign Affairs)
<b>H2020</b>	Horizon 2020 program	<b>MESRI</b>	Ministère de l'Enseignement Supérieur, de la Recherche et de l'Innovation (Ministry of Higher Education, Research and Innovation)
<b>AI</b>	Artificial Intelligence	<b>DFO</b>	Department of Fisheries and Oceans (Canada)
<b>ICSU</b>	International Council for Scientific Unions	<b>MUSE</b>	Montpellier Université d'Excellence
<b>IFSTTAR</b>	Institut français des sciences et technologies des transports, de l'aménagement et des réseaux (French Institute of Science and Technology for Transport, Development and Networks)	<b>NOAA</b>	National Oceanic and Atmospheric Administration (USA)
<b>HPEI</b>	Host-pathogen-environment interactions	<b>OECD</b>	Organization for Economic Cooperation and Development
<b>IMTA</b>	Institut Mines-Télécom Atlantique		
<b>IPEV</b>	Institut Paul Emile Victor		
<b>IRD</b>	Institut de Recherche et Développement (Institute for Research and Development)		

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<b>ODATIS</b>	Ocean Data Information and Services cluster within the TERRE data infrastructure
<b>SDG</b>	Sustainable Development Goals
<b>MDG</b>	Millennium Development Goals
<b>UN</b>	United Nations
<b>OFEG</b>	Ocean Facilities Exchange Group
<b>CFP</b>	Common Fisheries Policy
<b>SIDS</b>	Small Island Developing States
<b>IP</b>	Intellectual Property
<b>PIA</b>	Programme Investissements d’Avenir (French program for investment in innovation)
<b>SMB</b>	Small and Medium-Sized Businesses
<b>R&amp;D</b>	Research and Development
<b>ROV</b>	Remotely Operated Vehicle
<b>SATT</b>	Société d’accélération du Transfert de Technologies (Company accelerating technology transfer)
<b>SeaDataNet</b>	Pan-European infrastructure that manages ocean and marine data
<b>SIH</b>	Système d’Information Halieutique (Fisheries Information System)
<b>SIMM</b>	Système d’Information sur le Milieu Marin (Marine World Information System)
<b>SOA</b>	State Oceanic Administration
<b>TAAF</b>	Terres Australes et Antarctiques Françaises (French Southern and Antarctic Territories)
<b>TGIR</b>	Très Grande Infrastructure de Recherche (Very Large Research Infrastructure)
<b>TheoREM</b>	Test facilities for Hydrodynamics and Marine Renewable Energy
<b>UBL</b>	Université Bretagne - Loire
<b>UMR</b>	Unité Mixte de Recherche (Mixed Research Unit)
<b>UMS</b>	Unité Mixte de Service (Mixed Services Unit)
<b>UMSR</b>	Unité Mixte de Service et de Recherche (Mixed Services and Research Unit)
<b>UNCLOS</b>	United Nations Convention on the Law of the Sea
<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organization
<b>WHOI</b>	Woods Hole Oceanographic Institution



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