

The background of the slide is a complex, abstract pattern of flowing, organic shapes in various shades of blue and green. The colors transition from deep blues and purples on the left to lighter blues and bright greens on the right. The overall effect is reminiscent of a microscopic view of biological tissue or a fluid dynamic simulation.

**European Multidisciplinary Seafloor  
and Water Column Observatory**

**European Research Infrastructure  
Consortium**

Conclusion on KSQ  
and sub Q + Tables  
with KSQ  
Conclusion on  
needed technologies

# DAY 1-Intro- Ingrid

# Introduction to the workshop

Ingrid Puillat,

EMSO ERIC Director General

Rome, 11-13 March 2025

# Forewords

## Special Guests:

Austria, Bulgaria, Canada, Denmark, Georgia, Germany, Netherlands,  
Turkey, UK, Ukraine

About 15 private companies

Ministries' Delegates from Italy, France, Spain, Ireland,  
And the EMSO AoM Chairman





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- **Scope of the workshop**
- **Achievement highlights**
- **Towards the EMSO future**
- **About Today**

# Scope of the Workshop

# EMSO

## Nowadays

# Workshop Scope

11 cable and stand-alone observatories

3 test sites

8 Nations

> 25 Institutions involved

4 pillars (Marine ecosystem, Climate change, Geohazard, Technological challenge)

3 domains (Hydrosphere, Geosphere, Biosphere)



- **Long term repeat observations** on the bottom and in the water column but not necessarily both in each RF
- **Time-series of multidisciplinary**, synchronized, high resolution, near-real-time (or not) marine data
- **Power, communications, sensors and shallow** water facilities for testing new devices through interactive ocean observations
- Various other **services**

# Workshop Scope

Let's align our knowledge about the EMSO's history and its current status ...

## EMSO

- **What does EMSO mean for you in one word?**

Measure at sea? Observatory? Funding?  
Community? Europe? Unclear? Heterogeneity?  
Regions? Sleepv? ...

WORDCLOUD #1

<https://www.menti.com/alm872ccb9ov>





# European **M**ultidisciplinary **S**ea floor and water column **O**bservatory

## About semantic in EMSO

DEEP Ocean is not equal to Open Ocean and Sea...

⇒ DEEP vs Surface or Intermediate waters and DEEP vs SHALLOW?

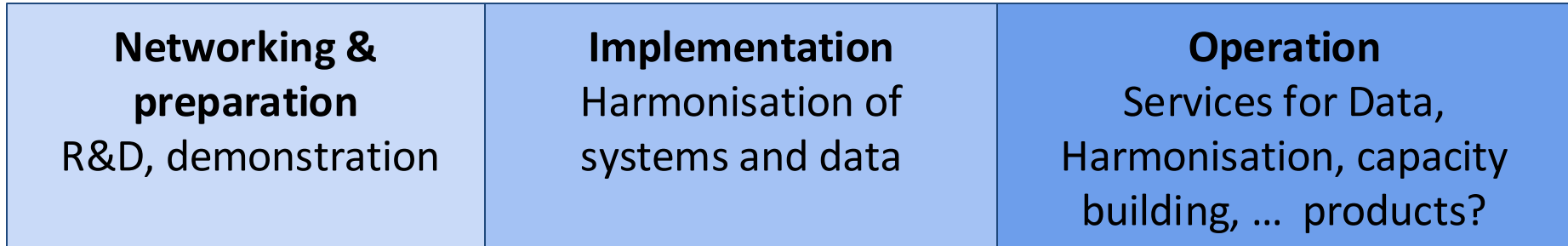
⇒ Vertical dimension

Let's use OPEN OCEAN or SEA versus COASTAL OCEAN or SEA

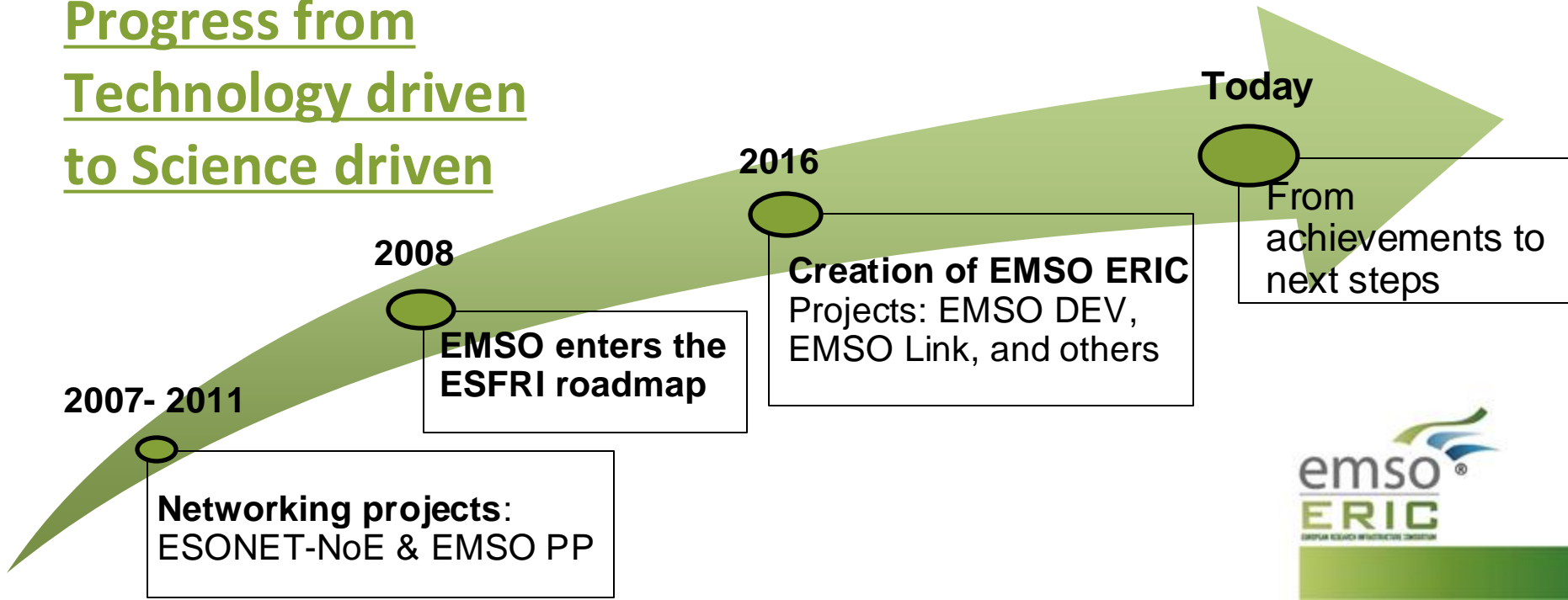
⇒ Horizontal coverage, Geographical domain

# Workshop Scope

**History**  
summary



## Progress from Technology driven to Science driven



## EMSO ERIC

- **What does ERIC mean for you in one word?**

WORDCLOUD #2

<https://www.menti.com/alm872ccb9ov>





**European Multidisciplinary Seafloor  
and Water Column Observatory**

**European** Research Infrastructure  
**Consortium**

# Workshop Scope

## EMSO : an ERIC

- A legal entity under the ERIC EU legislation
- Members are Countries, NGOs...
  - Notion of National Nodes (vs institutional partnership)
  - Central hub (vs coordination institution)
  - An operational structure differs from a governance structure





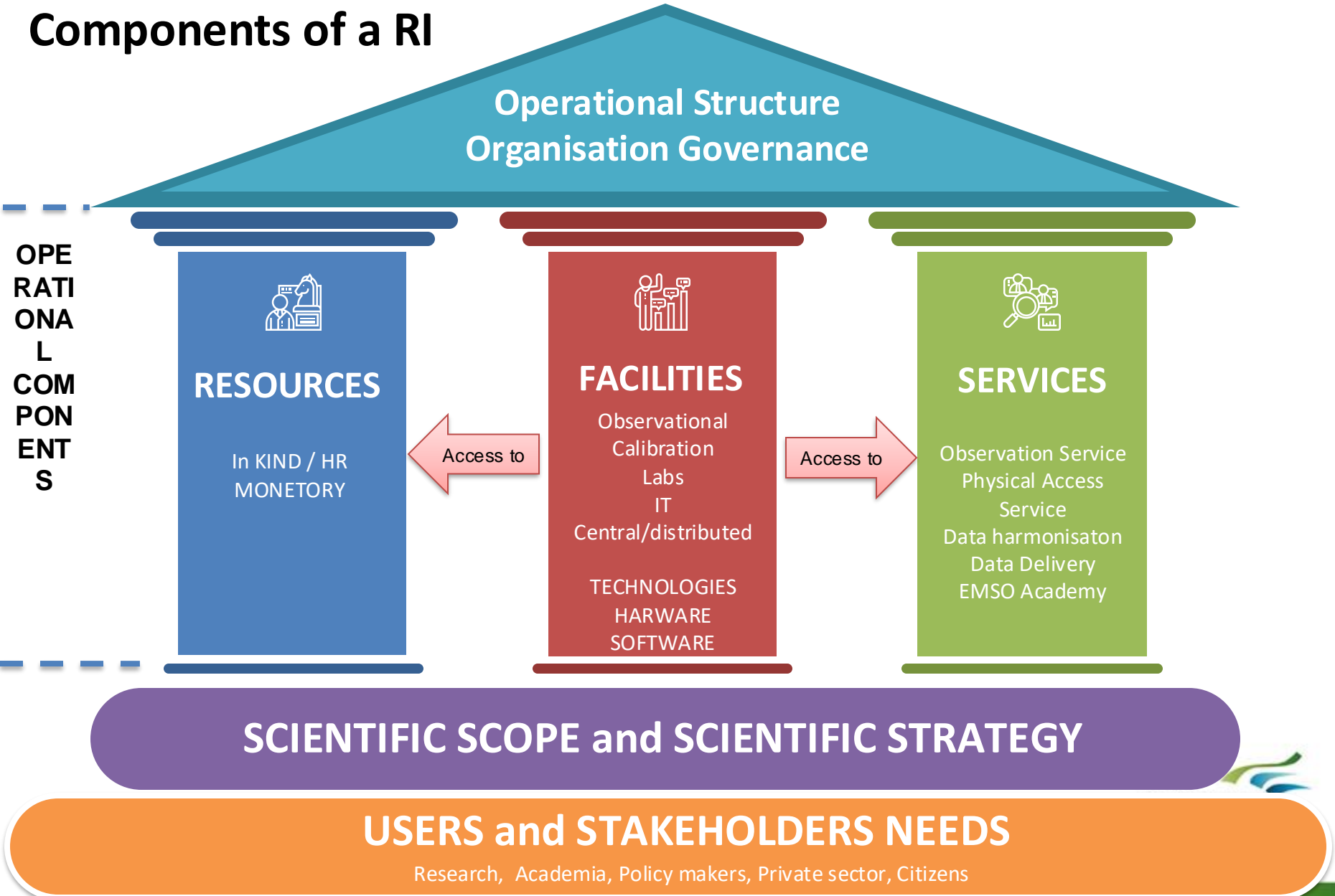
**European Multidisciplinary Seafloor  
and Water Column Observatory**

**European Research Infrastructure  
Consortium**



# Workshop Scope

## Components of a RI



## Research Infrastructure: EC definition

“ **Research Infrastructures** are facilities that **provide** resources and services for research communities to conduct research and foster innovation.

They can be used beyond research e.g. for education or public services and they may be single-sited, distributed, or virtual.

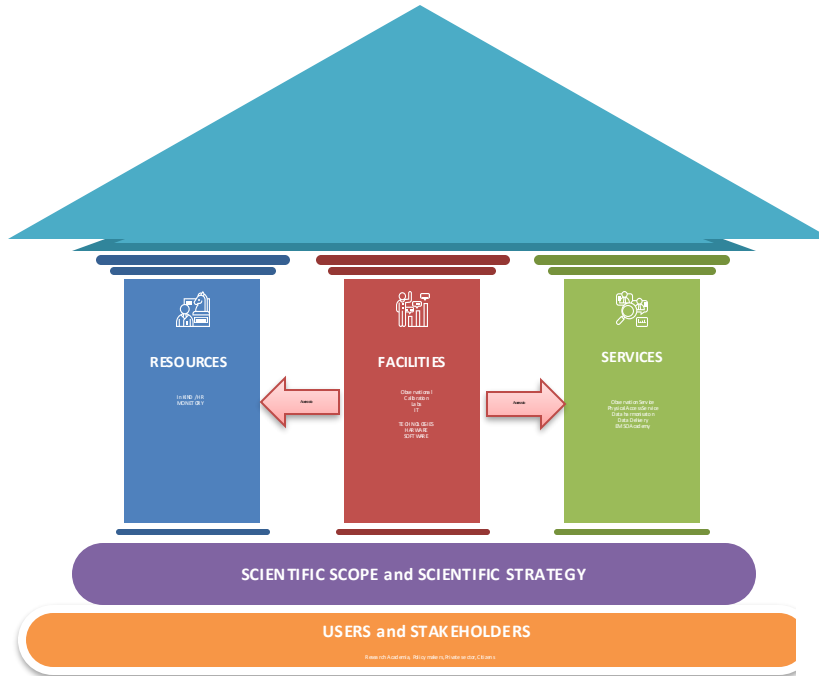
They include :

- major scientific equipment or sets of instruments
- collections, archives or scientific data
- computing systems and communication networks
- any other research and innovation infrastructure of a unique nature which is open to external users”

Source: [https://research-and-innovation.ec.europa.eu/strategy/strategy-research-and-innovation/our-digital-future/european-research-infrastructures\\_en#:~:text=Research%20Infrastructures%20are%20facilities%20that,sited%2C%20distributed%2C%20or%20virtual.](https://research-and-innovation.ec.europa.eu/strategy/strategy-research-and-innovation/our-digital-future/european-research-infrastructures_en#:~:text=Research%20Infrastructures%20are%20facilities%20that,sited%2C%20distributed%2C%20or%20virtual.)

# Workshop Scope

## Governance of EMSO



- Assembly of Members (AoM)

8 Countries

- Central Management Office

8-9 FTEs

- EMSO Facilities

14 **Regional Facilities**  
Observational RFs

- EMSO Services

4 Operational  
**Service Groups (SGs)**

EXCOM

- Scientific and Advisory  
Committee

12 Members

## Governance of EMSO



- EMSO Facilities
    - Facilities are Observational ones only
    - Facilities are Regional ones
- 14 RFs  
(Observational)
- EMSO Services
    - Services are organised in the so called 4 EMSO Service Groups that are acting as collaborative forum to design the evolution of the services and operate them
    - Operational character of the implemented services is supported only by a few key people => slow implementation process, lack of resources to make them visible
    - A 5th service group for the relation with the industry did not work, until a few months ago

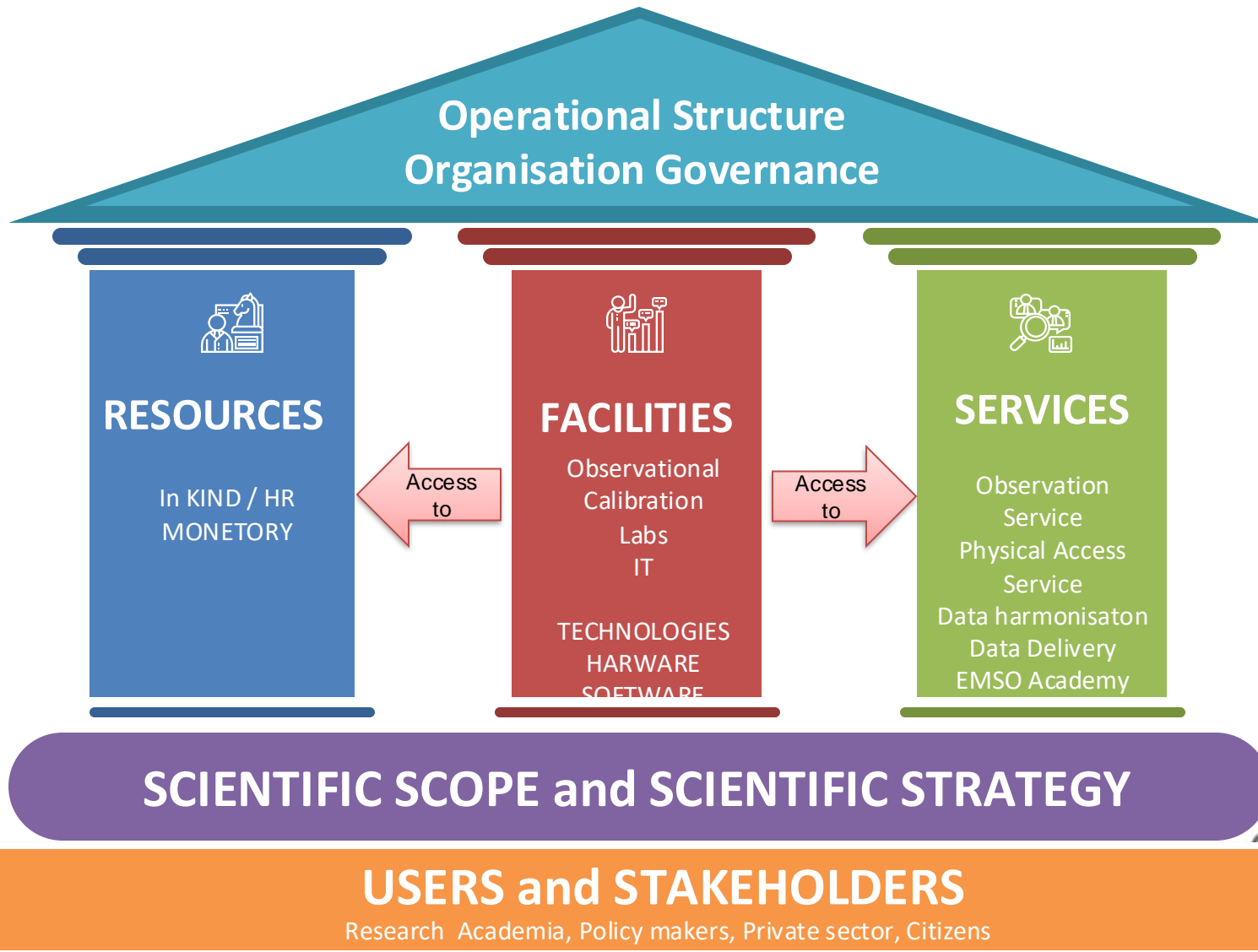
4 operational  
Service groups

**EMSO**

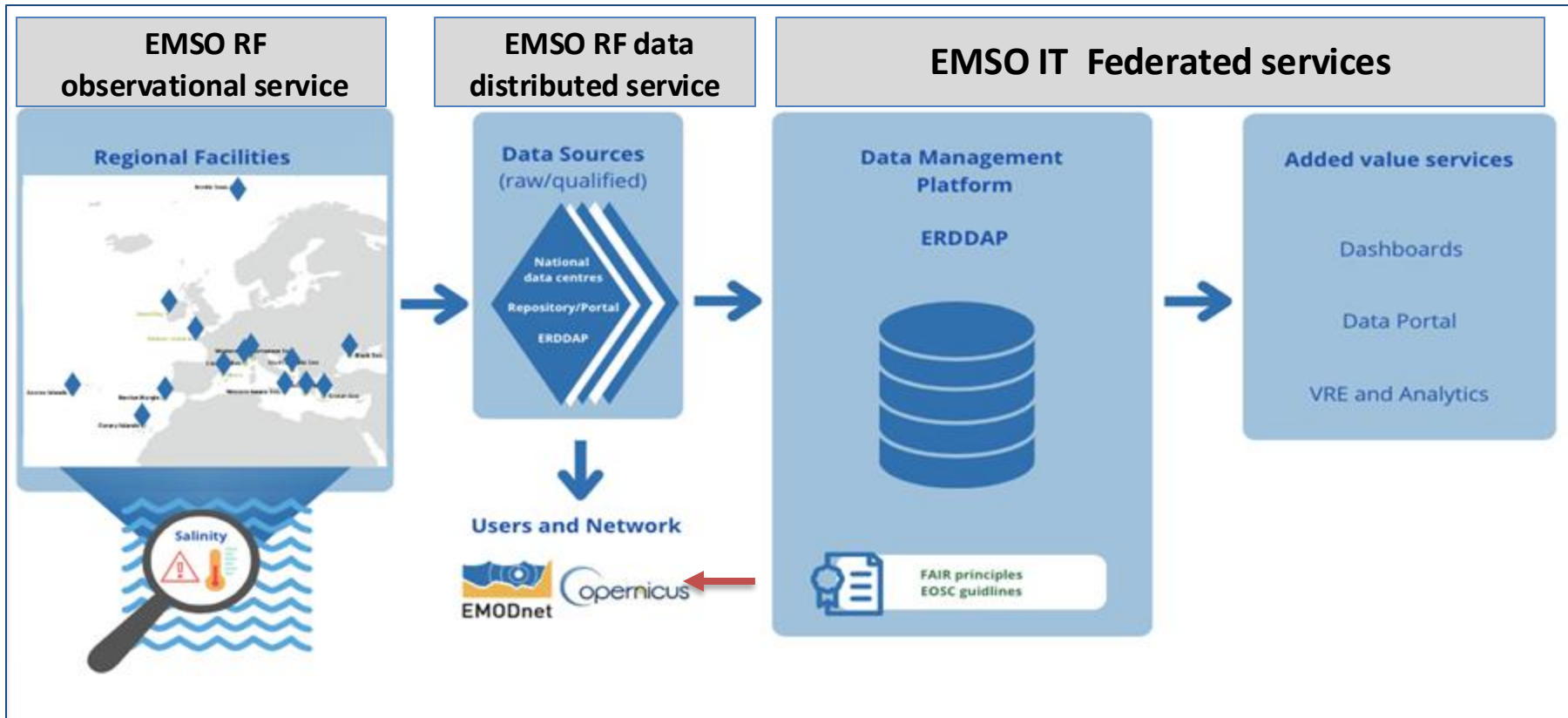
Nowadays

# Workshop Scope

## Operational structure of EMSO



## Operational structure of EMSO





**EMSO**  
Future

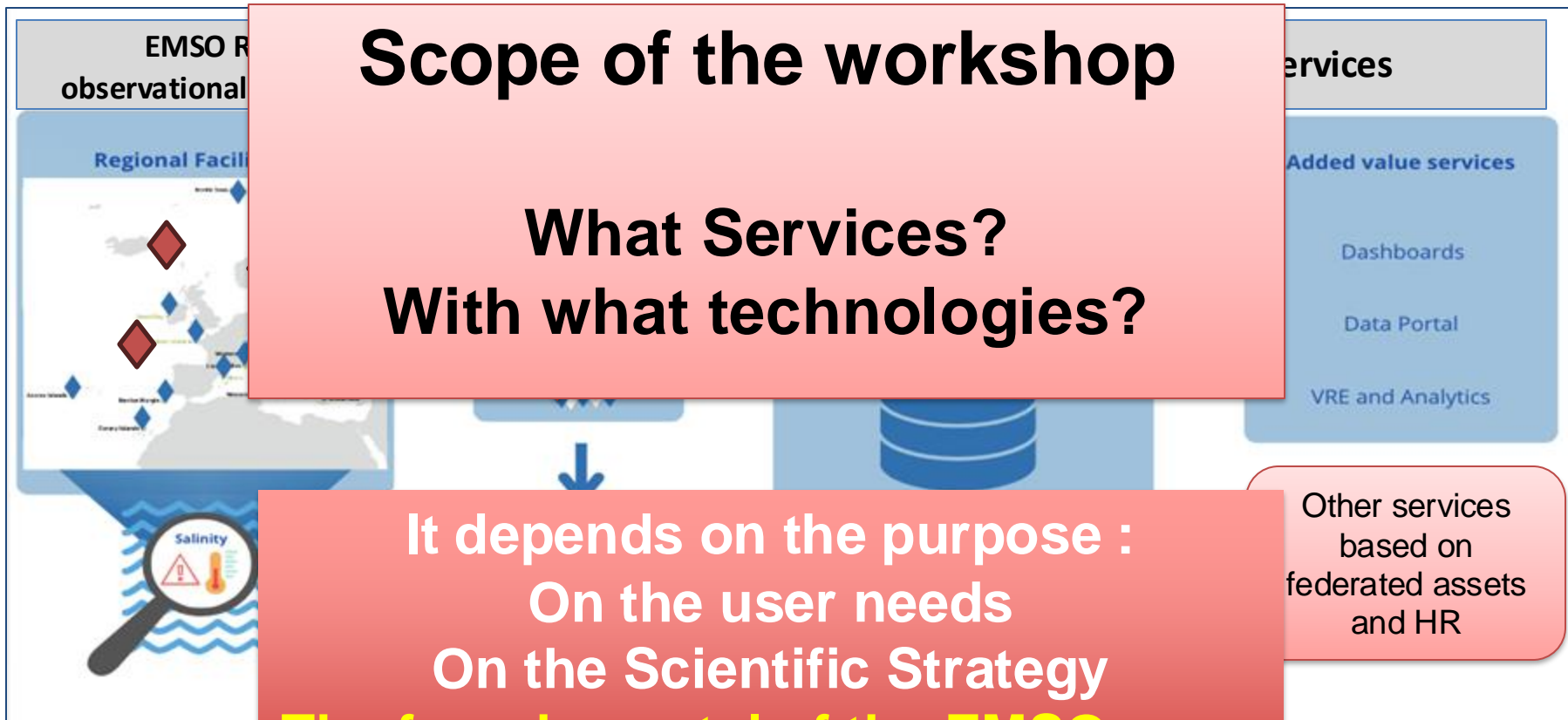
# Workshop Scope

## Operational structure of EMSO

### Scope of the workshop

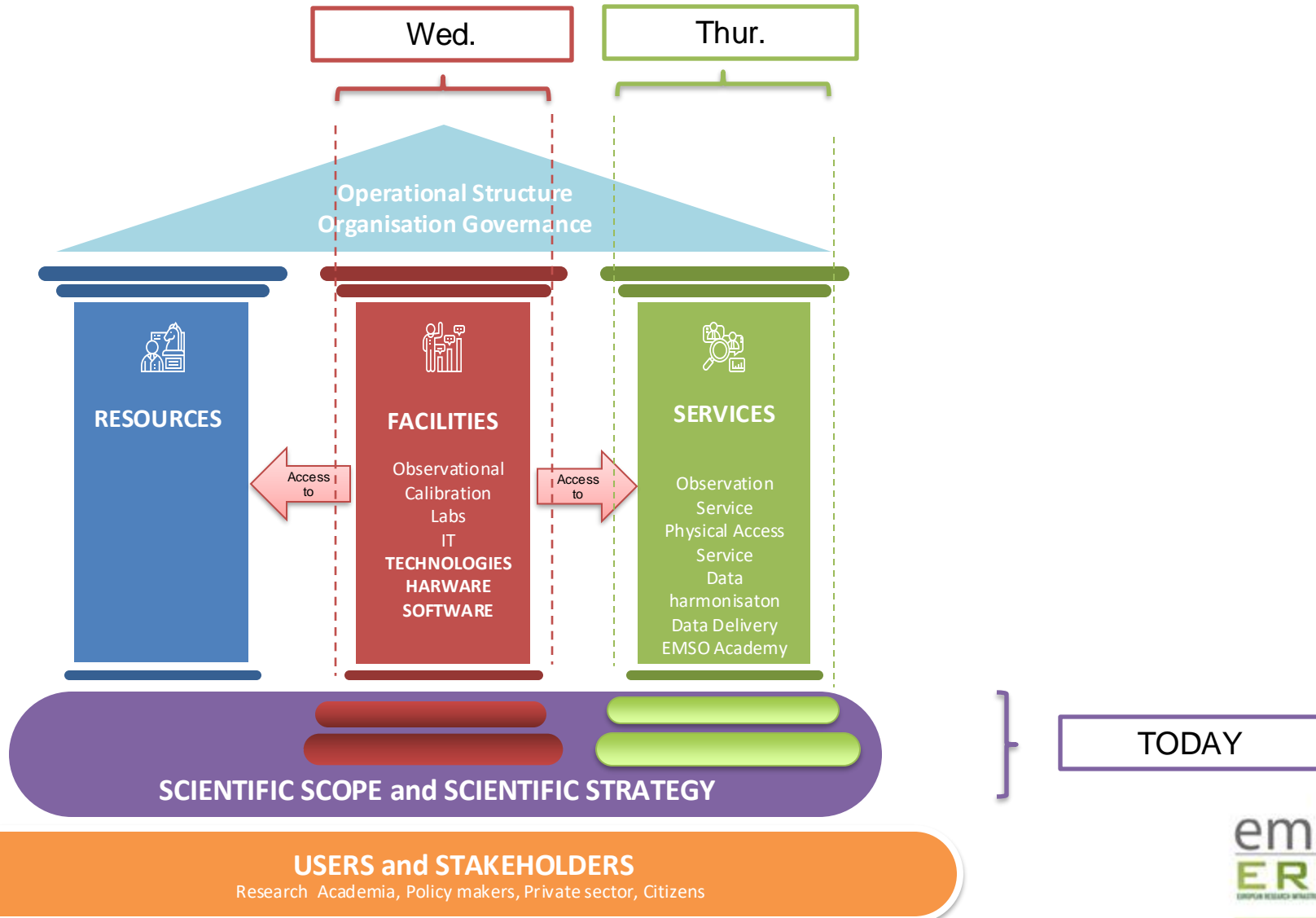
**What Services?  
With what technologies?**

It depends on the purpose :  
On the user needs  
On the Scientific Strategy  
**The fundamental of the EMSO wave**



# Workshop Scope

## Workshop Structure



# Achievement Highlights

# Achievement Highlights

## Communication Service Group

- **EMSO Newsletter**  
3 issues in 2024)
- **Increasing of followers and interest in the EMSO communication**
- **Social Media Campaign**  
#DiveInEMSO (5 RFs)  
Physical Access Programme  
Campaign for the AQUARIUS  
EU project
- **IT/ Data Engineering System Position Advertised**  
(+ LinkedIn and Research Gate)
- **EMSO Academy**  
webinars and first Mobility of Personnel Program 2025
- **Interviews with EMSO community and users**  
*EGIM: an interview with Nadine Lantéri*
- **Visuals for EMSO Webinars and Regional Facilities map**

# Achievement Highlights

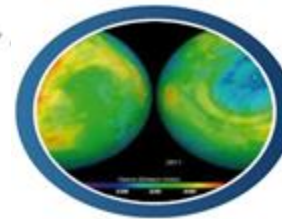
## Science Service Group

**SCIENTIFIC  
SCOPE  
and  
SCIENTIFIC  
STRATEGY**

**MARINE  
ECOSYSTEMS**

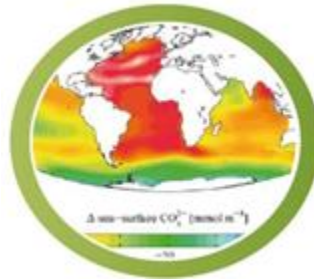
**CLIMATE  
CHANGE**

**GEO-  
HAZARD**



Earth interactions hydrosphere,  
biosphere, lithosphere, atmosphere

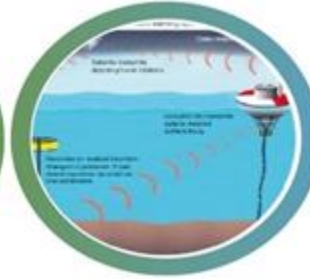
**SOCIO  
ECONOMICAL  
CHALLENGES**



Global ocean  
warming and  
acidification



Sustainability  
of Marine  
Resources



Geohazards: early  
warning systems  
for earthquakes &  
tsunamis



Impacts of climate  
change on marine  
ecosystems  
& mitigation

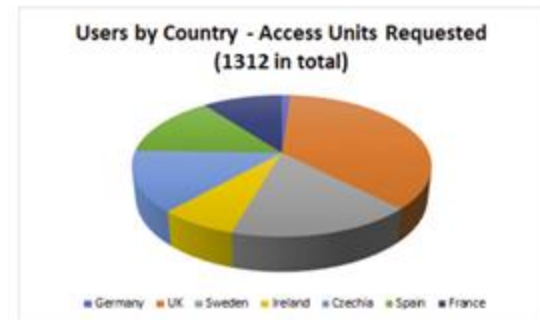
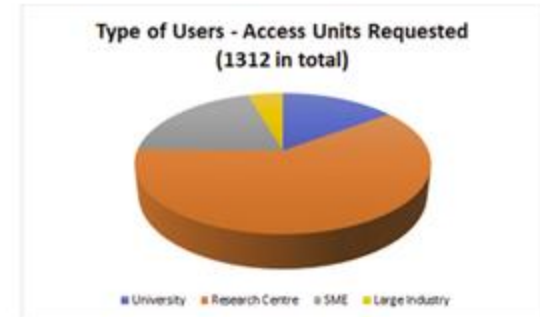
# Achievement Highlights

## Engineering and Logistic Service Group

**Supervises and addresses engineering and operational technological aspects of EMSO infrastructure to:**

- Promote best practices and interoperability across EMSO
  - Best Practices Working Groups (Currently running: ADCP, EGIM, Cable observatories)
  - Ex: ADCP WG: visit to SHOM, multiple team working sessions (George, Minke, etc)
- Propose and contribute to the adoption of new technologies and operations
  - Ex: Cable Observatory WG
- Optimize RF operations and maintenance activities
  - Solving specific system/instrument measures
  - EMSO Inventory actualisation
- Coordinate the programme for physical access to the infrastructure
  - 10 projects have been supported. The 2025 call is opened

10 projects have been funded since the program was launched in April 2022:

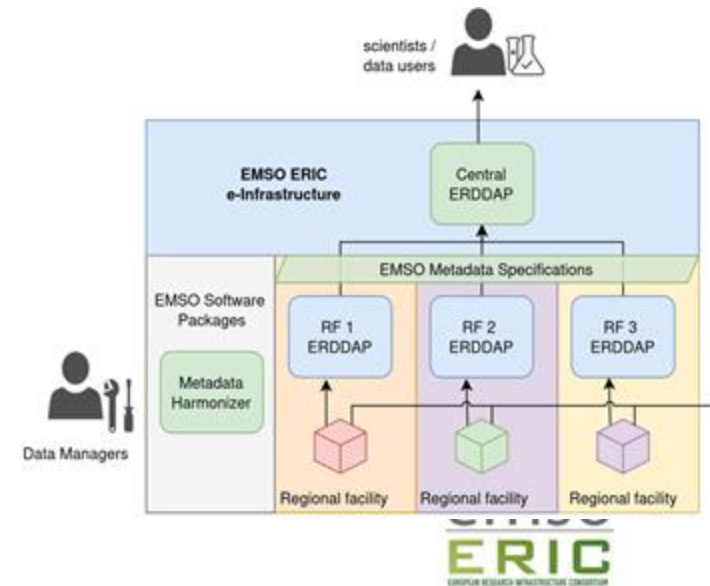
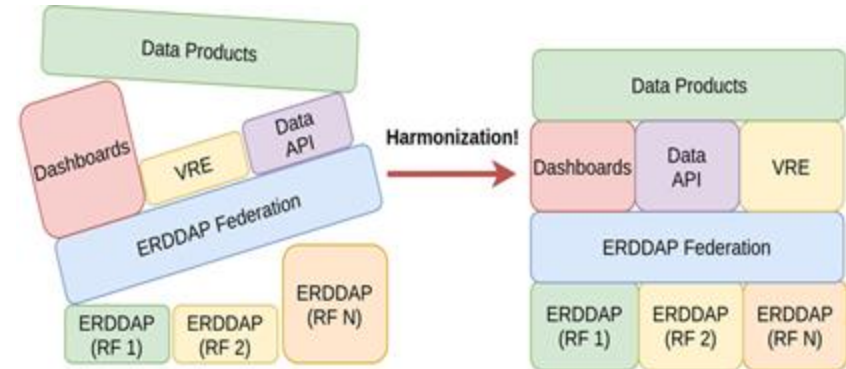




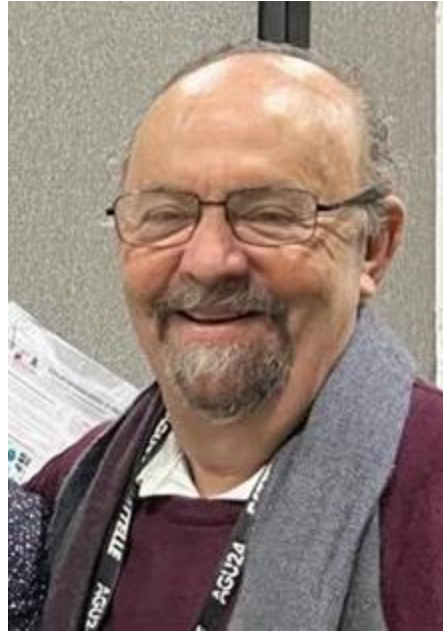
# Achievement Highlights

## Data Management Service Group

- Metadata Harmonization
  - EMSO Metadata Specifications
  - Metadata Toolbox:
    - NetCDF generator
    - Harmonization Checker
    - ERDDAP autoconfig
- ERDDAP Federation:
  - Harmonized data across RFs
  - Single point of entry for EMSO data



# Achievement Highlights



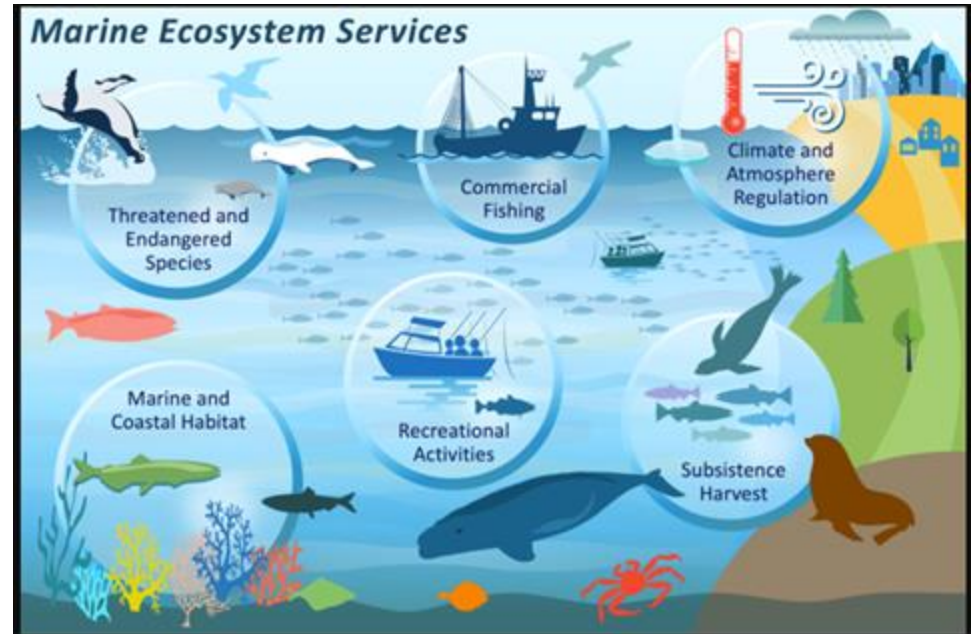
**Challenges met by the former EMSO DG  
Juanjo Danobeitia,  
CSIC, Spain and JTF Smart cable Liaison with UNESCO-IOC**

# Towards the EMSO future

And more on the workshop ...

## Why?

- Curiosity driven science versus applied one
  - => feed scientists
- Environmental protection ideology
  - => nature protection and human well being
- Socio Economy impacts
  - => € and €€ and €€€...



<https://www.fisheries.noaa.gov/feature-story/accurately-accounting-economic-value-marine-ecosystems>

## EU dedicated programmes and policies

- MSFD Marine strategy Framework Directive
- Green Deal => EU development with Climate neutrality
- Copernicus and CMEMS=> Data and services for policy implementationn support Blue Growth and Scientific innovation
- Integrated Maritime Policy (IMP) => Blue Growth, marine data and knowledge, maritime spatial planning

# Towards the Future

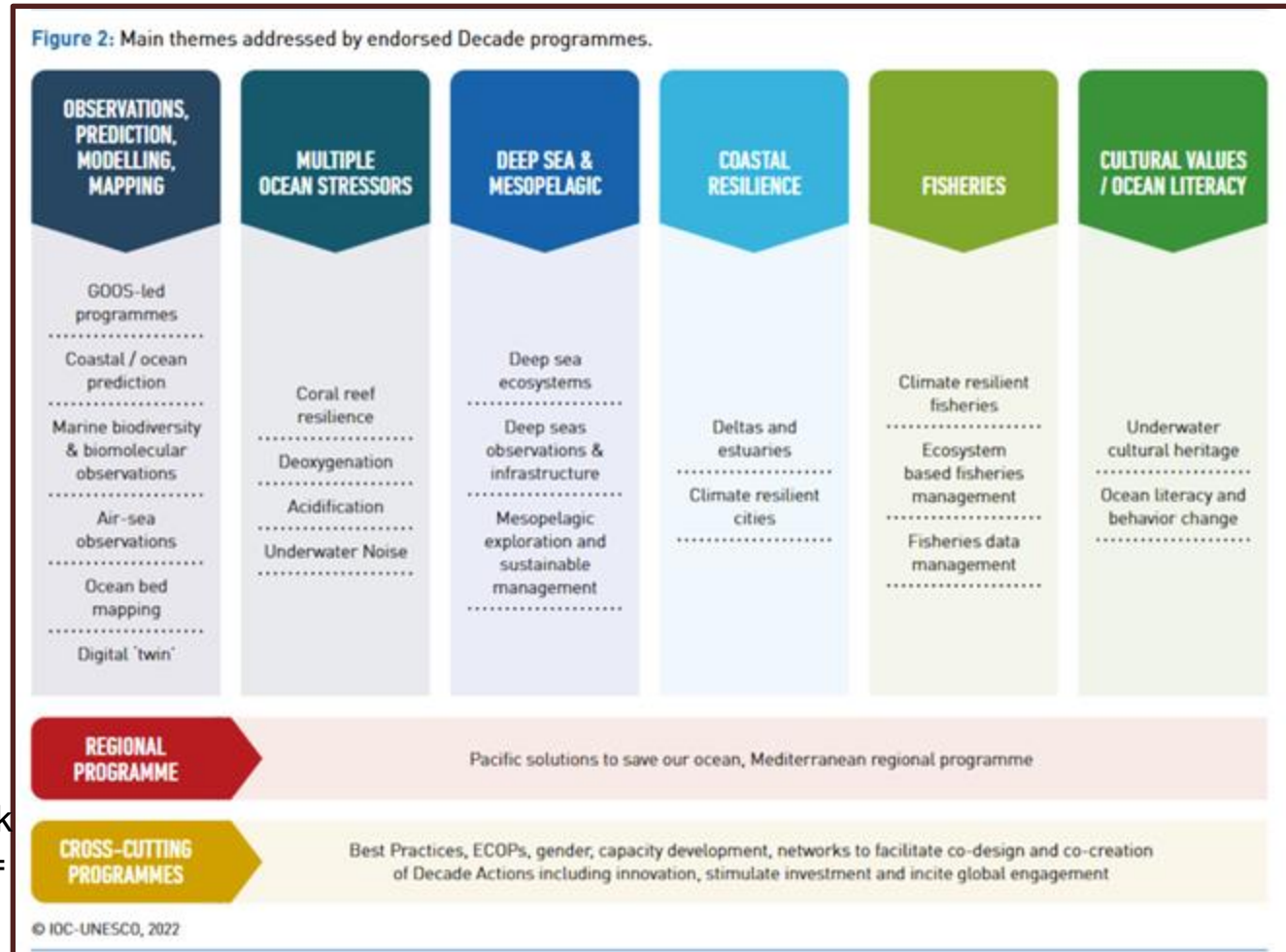
The UN General Assembly mandated UNESCO's Intergovernmental Oceanographic Commission (IOC) to coordinate the preparations and implementation of the Decade



2021  
2030 United Nations Decade of Ocean Science for Sustainable Development

UNESCO-IOC (2022). Ocean Decade Progress Report 2021–2022. UNESCO, Paris. (The Ocean Decade Series, 37)

<https://unesdoc.unesco.org/ark:/48223/pf0000381708.locale=en>



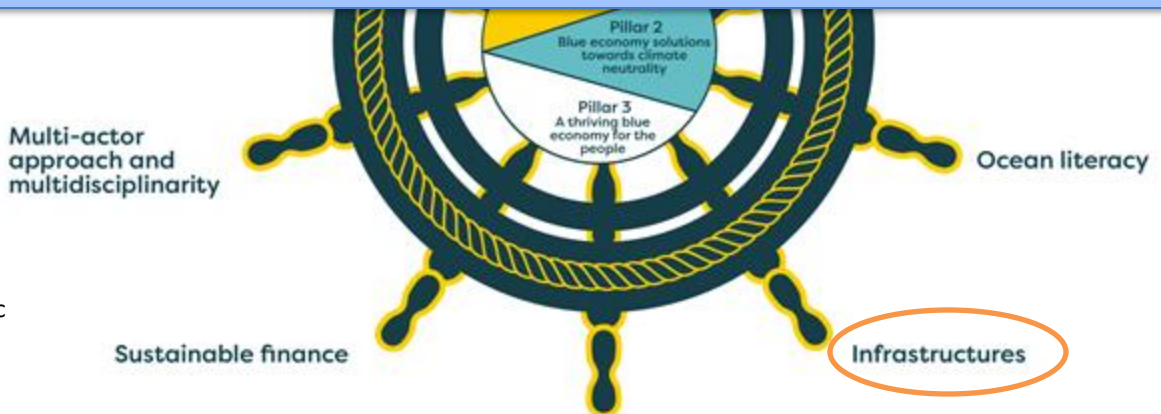
# Towards the Future

*Europe's Choice: POLITICAL GUIDELINES FOR THE NEXT EUROPEAN COMMISSION 2024–2029,*  
Ursula von der Leyen



- A European **Oceans Pact** will focus on **boosting the blue economy** and **ensuring** the good governance and **sustainability of our oceans** in all of their dimensions.
- Overview of the pillars and enablers of the EU Sustainable Blue Partnership.

« Blue Growth » and  
« Sustainability of the Ocean »,  
the key words for the future



. In Benjamin Kürten, Margherita Cappelletto, Margherita Zorgno, Giorgio Carpino, Anne Magnussøn, Jon Flæten, Marianne Areng (2024) Sustainable Blue Economy Partnership – Strategic Research and Innovation Agenda 2024. DOI: <https://doi.org/10.5281/zenodo.14243414>

# Towards the Future

## ESFRI monitoring of EMSO ERIC

- A key milestone in the operation phase of an ERIC
- Some recommendations on
  - Scientific strategy
  - Technology roadmap
  - User and stakeholder partnership
  - Sustainability
  - In general

**Great Thanks to the CMO**



## ESFRI monitoring: Key recommendations on Pan-EU relevance

### Geographical extension and Basin representativity

- Capability to expand to cover shallower waters, **possibly in conjunction with other RIs.**
- Open question as to whether the science output already reflects **representativity** for the regional marine conditions
  - => **selection criterion for observation platforms**, i.e. whether regional or wider studies benefit sufficiently from the EMSO offer.
- The true interlinkage of data over large spatial scale would involve **modelling** (e.g. flexible grid model FESOM), and EMSO should examine how stronger **collaboration with marine modelling community** can improve the integration of data into marine hydrographic and weather models.
- With its focus on deep-sea oceanic environments, EMSO most probably has a unique contribution **to wider oceanic issues at basin scale.**

# Towards the Future

## Resources

### Key Recommendations on nation commitments and resources

- Improve the representation of EMSO in national ESFRI roadmaps
- The position of the CMO **seems to be weak in relation with the national nodes**. Compared to other distributed ERICs it has a **rather low number of FTEs**.
- Risk mitigation is needed for the over reliance on host country premium and income from EU-funded projects. Financial contributions: (1) members pay membership fees (2) ES, IT contribute in-kind and (3) participation in the EU-funded projects. **The proportion between the 3 funding streams is a point of concern.**

# Towards the Future

## Six Strategic goals

Today

Tomorrow

Friday

### Scientific goal

Refine and upgrade the EMSO Scientific and Technology strategy and progress towards the regional scale



### Service Operation Goal

Root long-term internal operation of technical services to EMSO members for an Excellent Research



### Governance Goal

Revise the EMSO Governance and matter its potential upscaling

### Technology Goal

Reduce EMSO environmental impacts with technologies dedicated to improve the EMSO efficiency



### Sustainability Goal

Raise the EMSO socio economic impacts to support a long-term financial sustainability



### Promotion & Awareness Goal

Re-energise the EMSO engagements in EU and worldwide initiatives

# Today objectives

# Towards the Future

## Current EMSO Scientific Strategy

SCIENTIFIC  
SCOPE  
and  
SCIENTIFIC  
STRATEGY

**DAY 1: TODAY**

Earth interactions hydrosphere,

Very Broad, To be refined

=> the ID card of EMSO: LONG TERM Time series  
in EMSO Regions

Across EMSO Regions:  
Sense of the EMSO Community

tsunamis

& mitigation



# Scientific goal

**Refine and upgrade the Scientific and Technology strategy and progress towards the regional scale**

EMSO's scientific scope make it unique and is its main strength. Its large scope include:

1

Play a key role in the **monitoring** of **marine geohazards** thanks to its bottom equipment

2

Long term study and monitor **impacts** of the **Climate change** on both the seafloor and through the water column in key areas

Given the broad focus, it is essential to streamline the scientific strategy around the Key Scientific Questions (KSQ) the community wishes to jointly address.

In the current era of the global green and digital transition, EMSO must **Reinforce** its scientific scope to better satisfy the current scientific and societal needs, whilst also updating its technology strategy accordingly.

## Strategic Objectives

- SO.1.1 Define the key scientific questions
- SO.1.2 Expand the scientific & geographic scope
- SO.1.3 Enlarge the community
- SO.1.4 Promote EMSO higher-level products



# Today Objectives

## Strategic Objective of the Scientific Goal

- SO.1.1 Define the Key Scientific Questions (KSQs)

14 RFs have defined 4 KSQs & subquestions.

We are a consortium with common objectives to contribute to.

- i. **How far RFs are contributing to these questions?**
- i. **Where and What are the strongest contributions?**
- i. **Where is the expertise (and resources) to answer them?**

## Strategic Objective of the Scientific Goal

- SO.1.2 Expand the scientific & geographic scope

Strategy to better address the regional scale(S)?

About the definition of Regional Scale

Vs the studied processes (hydrodynamics, Geophysics, Biology)

Vs Regional observational coverage of the EMSO facilities

- i. **Needed revision of the sampling strategy?**
- ii. **Needed update of the deployed technology in observational RFs?**
- iii. **New observational technologies?**

# Today Objectives

Better root the services

In a refined Scientific Strategy

Operational Structure  
Organisation Governance

## FACILITIES

Observational  
Calibration  
Labs  
IT

TECHNOLOGIES  
HARWARE  
SOFTWARE

Access to

## USERS

Research  
Academia  
Policy makers  
Prive sector  
Citizens

Access to

## SERVICES

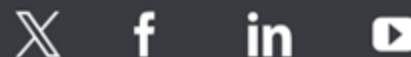
Observation Service  
Physical Access  
Service  
Data harmonisation  
Data Delivery  
EMSO Academy

SCIENTIFIC SCOPE  
SCIENTIFIC STRATEGY





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