# Integration of biodiversity monitoring data into the Digital Twin Ocean (DTO-BioFlow)

*Carlota Muñiz, Klaas Deneudt*
*Flanders Marine Institute (VLIZ)*

Monday, 22nd April 2024

*Data Grant Holders Workshop*, Oostende - Belgium

# DIGITAL TWIN OCEAN

### An interactive replica of the ocean for better decision-making

A **digital space** providing access to **vast amounts of data, models, artificial intelligence and other tools**, which will allow the **replication of the properties and behaviours of marine systems,** including ocean currents and waves, marine life and human activities, and their interactions, in and near the sea.

**EU MISSIONS**
RESTORE OUR OCEAN & WATERS

**Real Ocean**

**Digital Twin Ocean**

Satellite data

Marine data

Advanced models

Artificial intelligence

Citizen science
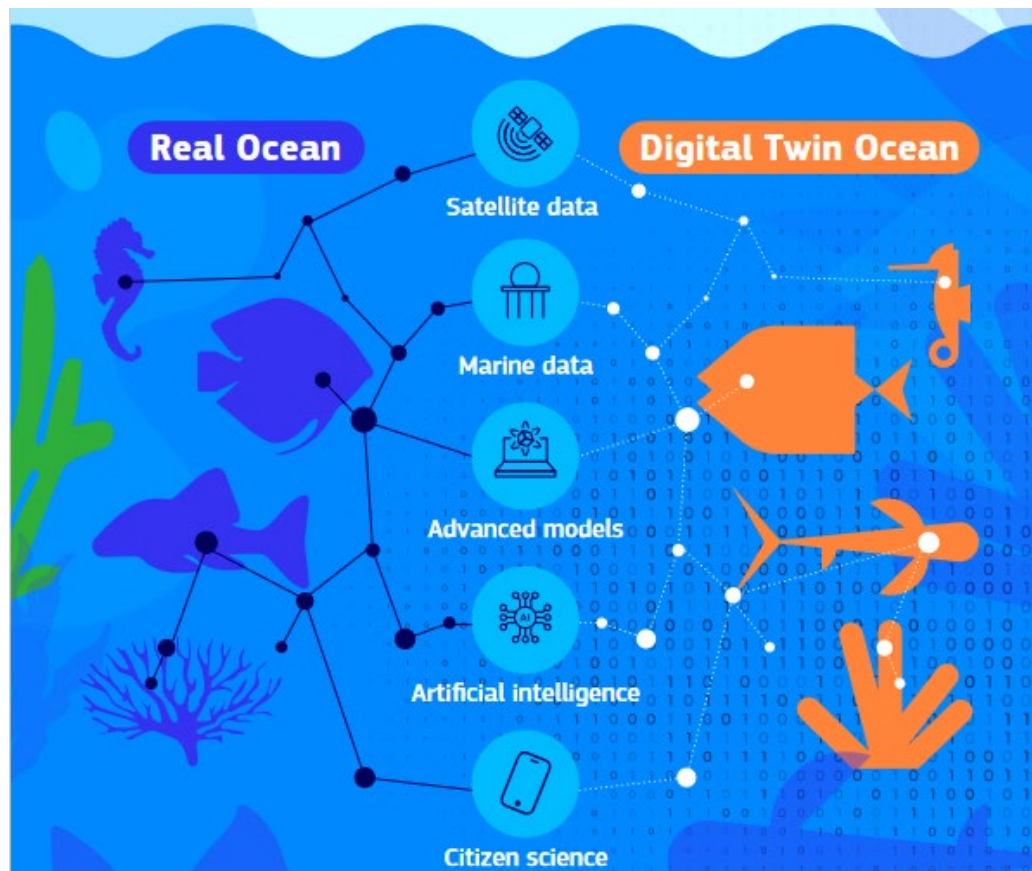
## Better decision-making

By connecting data and models through tailor-made applications, scientists, marine experts, policymakers, entrepreneurs and user-driven applications **can test different specific scenarios.**

**This allows us to:**

Better understand the ocean

Simulate alternative scenarios

Predict its response to changes

**Make the best informed decisions**

# DTO-BioFlow

**DTO-BioFlow**
Integration of biodiversity monitoring data into the Digital Twin Ocean

EU **MISSIONS**
RESTORE OUR OCEAN & WATERS

## Integration of biodiversity monitoring data into the Digital Twin Ocean

## HORIZON-MISS-2022-OCEAN-01-07: Integration of biodiversity monitoring data into the Digital Twin Ocean

### AIM

- Expand the collection of ocean datasets related to biodiversity (species, habitats, ecological interactions, human activities, and their impacts)
- Make it available through the Digital Twin of the Ocean
- Support the development of tools for a better assessment of human activities on marine biodiversity

**OBJECTIVE:**

*DTO-BioFlow will unlock "sleeping" biodiversity data,* ***enabling the sustained flow*** *of these and new* ***biodiversity monitoring data into the EU Digital Twin Ocean****. It will create essential components for a digital replica of marine biological processes, transforming new and existing data flows into evidence-based knowledge.*

**Key facts:**

- ≋ HORIZON-MISS-2022-OCEAN-01-07
- ≋ **42** project months
- ≋ From **Sept 2023** until **Feb 2027**
- ≋ **€10.0 million** EC funding
- ≋ **€1.0 million** FSTP grants
- ≋ **32** participants (**28** beneficiaries + **2** affiliated + **2** associated partners)

# Consortium
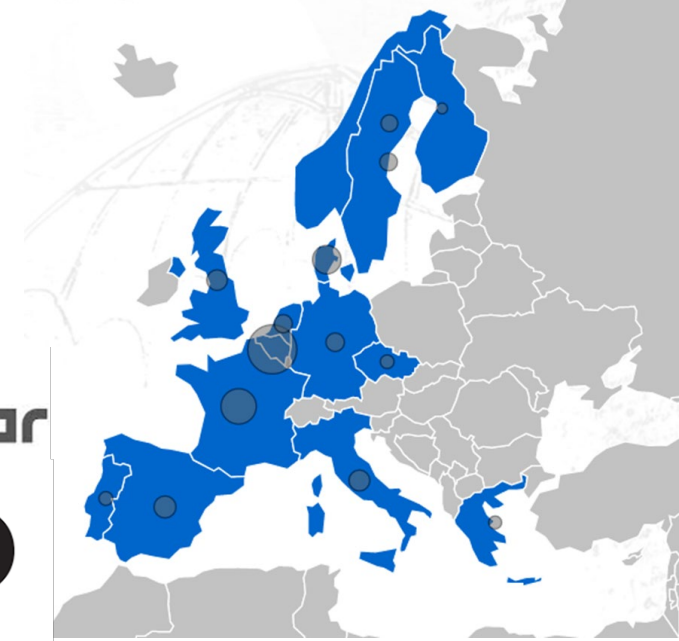
# Objectives
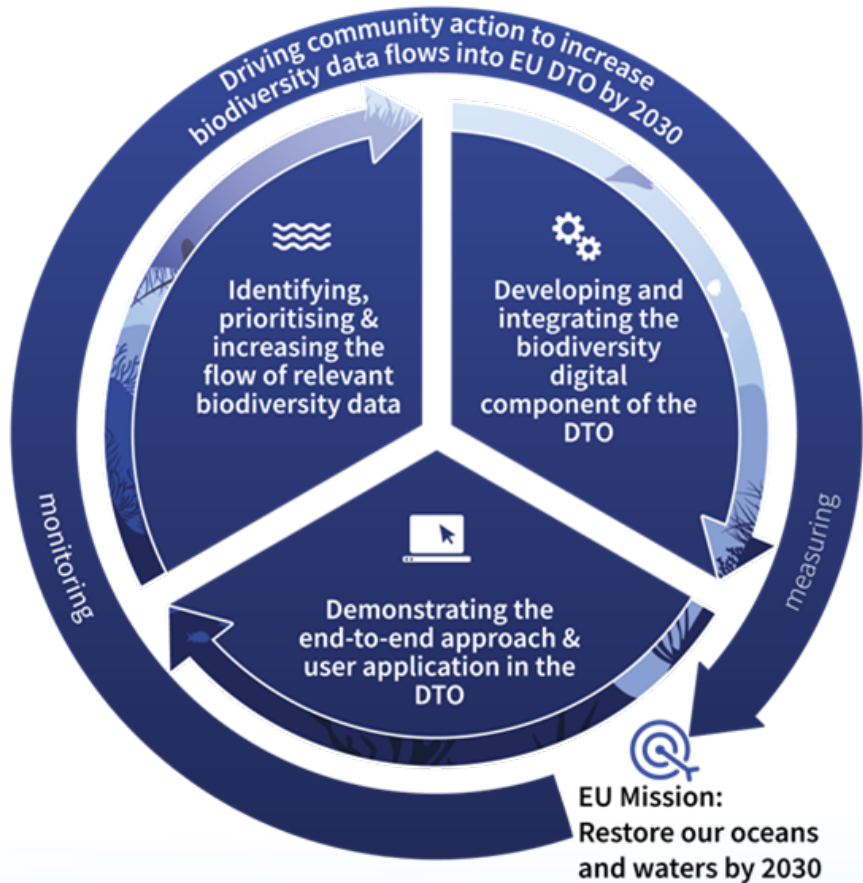


- OO1: **Increase the flow of relevant biodiversity data,** by assessing opportunities and unlocking current barriers to assimilation and ingestion.

- OO2: **Develop and integrate the biodiversity digital component** of the EU Digital Twin Ocean **ensuring sustainable data flows** after project end.

- OO3: **Demonstrate an end-to-end approach for biodiversity monitoring** based on the digital environment provided by EU DTO & data sources

- OO4: Establish mechanisms to monitor, **measure progress & drive community action** towards increasing biodiversity data flows into EU DTO by 2030

# Workpackages

# Increasing the flow of relevant biodiversity data (WP2)

*WP2 will analyse the biodiversity data landscape towards **identifying missing and necessary data to enable a functioning DTO** to support the EU to deliver on its biodiversity goals.*

- Create an inventory and assess efforts to **define biodiversity monitoring priorities** for data collection
- Inventory of **unavailable data sources**
- Assess the **impact of missing data** on the ability of digital solutions to represent reality and forecast future scenarios
- **Identify existing barriers** and develop pathways to remove or reduce the barriers.
- **Open Data Calls** to facilitate and encourage data sharing

# Enabling sustained flows of biodiversity monitoring data into the DTO (WP3)

- Building the biodiversity component with observation networks:
  - **Genomics** (plankton, soft and hard-bottom communities)
  - **Plankton imaging** (phyto and zooplankton)
  - **Biologging** (fish, mammal, and birds)
  - **Passive acoustics** (echo-location of cetaceans)
  - Other sources (e.g. citizen science data, official reports, literature-based data)

- Objectives:
  - 1. Test casing cost-effective biomonitoring
  - 2. Implementation of standards, quality assurance, data models and communication protocols
  - 3. Extraction and processing into harmonised and fit-for-purpose science-based data products
  - 4. Sustainable ingestion procedures to DTO



**Monitoring networks**

Test casing cost-effective bio-monitoring

Standardisation, quality control and communication

Re-usable data models & ingestion procedures

ETN, Movebank
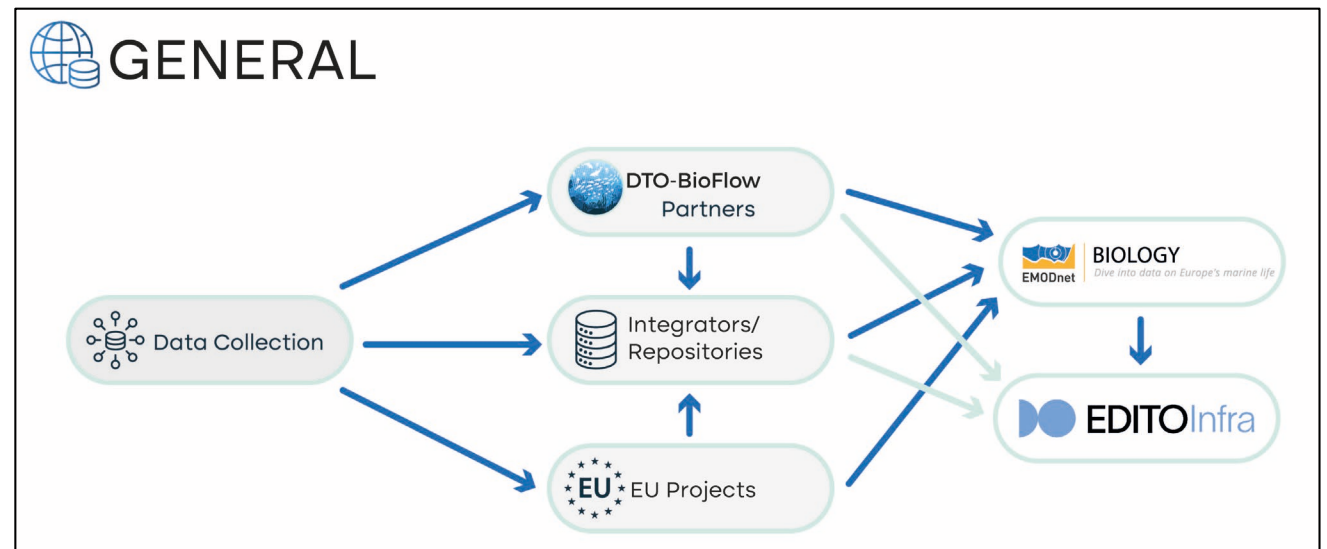
EcoTaxa

SBDI-ASV

...

EurOBIS EMODnet

# Enabling sustained flows of biodiversity monitoring data into the DTO (WP3)

- Building the biodiversity component with observation networks:
  - **Genomics** (plankton, soft and hard-bottom communities)
  - **Plankton imaging** (phyto and zooplankton)
  - **Biologging** (fish, mammal, and birds)
  - **Passive acoustics** (echo-location of cetaceans)
  - Other sources (e.g. citizen science data, official reports, literature-based data)

- Objectives:
  - 1. Test casing cost-effective biomonitoring
  - 2. Implementation of standards, quality assurance, data models and communication protocols
  - 3. Extraction and processing into harmonised and fit-for-purpose science-based data products
  - 4. Sustainable ingestion procedures to DTO

# End-to-end approach for policy relevant use cases (WP4)



**Science-based data compilations and products**

DTO data repositories

Quality Control

**Developing tools for policy: Demonstrator Use Cases (DUCs)**

- DUC-1: Invasive species management
- DUC-2: Adaptive offshore construction and energy harvesting
- DUC-3: Assessment of plankton diversity in relation to human impact
- DUC-4: Spatial planning of sustainable mariculture
- DUC-5: Ecosystem based spatial planning and MPA management
- DUC-6: Low impact fisheries
- DUC-7: Ecosystem services, esp. carbon sequestration
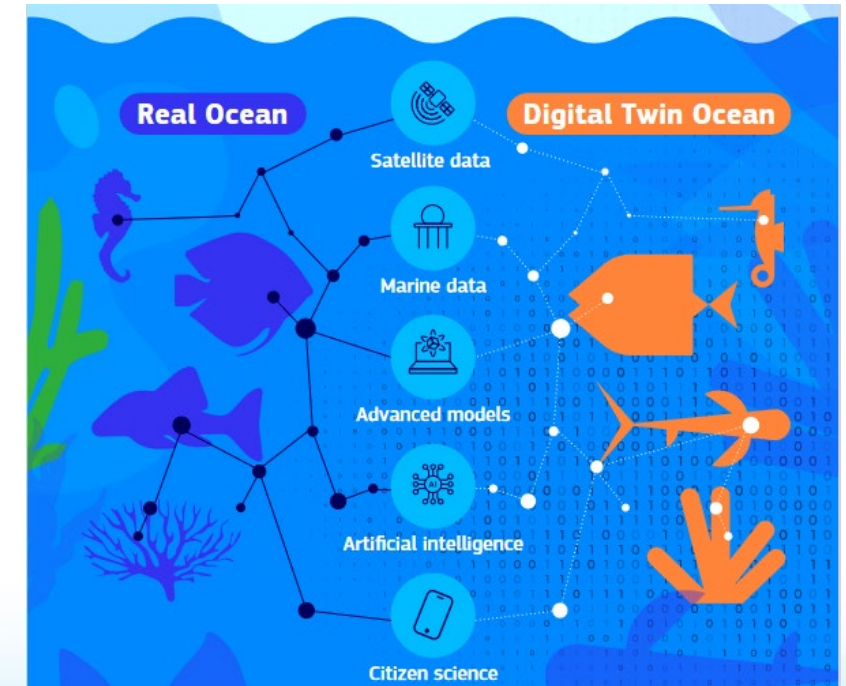
# Integration in the DTO infrastructure (WP5)

≋ Support operationalized data streams and demonstrators: **scalability**

≋ **Interoperability, compatibility** and alignment with DTO and other initiatives (Digital-Twin-ready standards)

≋ Governance framework regulating access to DTO infrastructure

# Outcomes

- European and global **marine biodiversity observation and monitoring is more targeted and cost-effective**;

- **Integration of biodiversity data and information into** the Mission's precursor digital ocean and water knowledge system and **DTO** architectures;

- Fit-for-purpose **digital tools and services to support policy making** integrated in DTO environment;

- Generate **enhanced knowledge** of marine biodiversity, its state, and pressures; evidence-based policy making;

- **New dataflows**;

- User-targeted **demonstrator use cases** and new knowledge;

- Strategic **foresight report for increasing biodiversity data flows into DTO by 2030**;
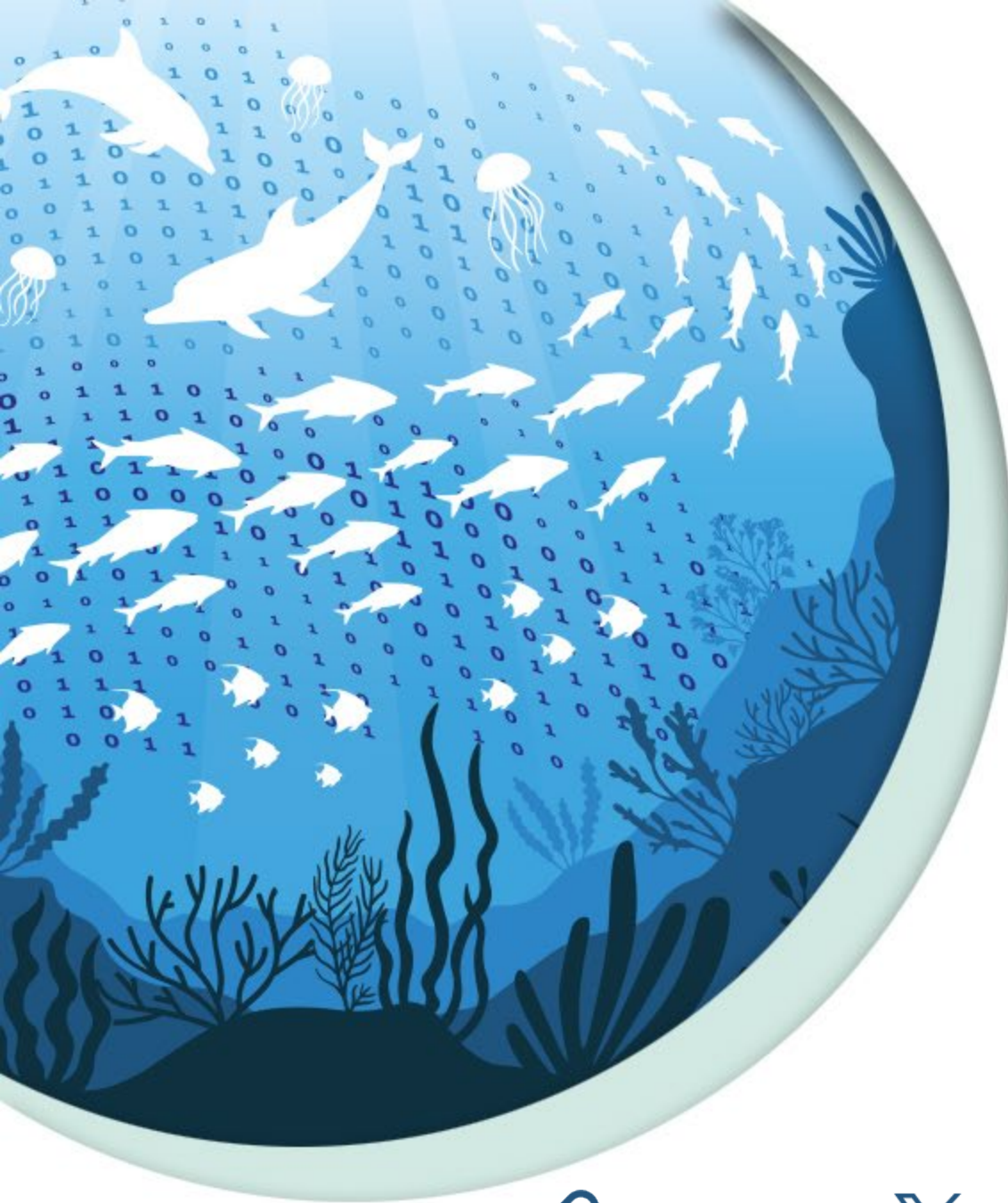
**DTO-BioFlow**
Integration of biodiversity monitoring data into the Digital Twin Ocean

For any other questions please contact info@dto-bioflow.eu

# THANKS!

dto-bioflow.eu    @DTOBioFlow    /company/dto-bio-flow    @DTOBioFlowProject