BMD
Biodiversity Meets Data

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https://doi.org/10.3030/101181294

Funded by
the European Union

BMD
Biodiversity Meets Data

Biodiversity Meets Data

Dr. Niels Raes
BMD coordinator

Naturalis Biodiversity Center

Funded by the European Union

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- The Horizon Europe ‘Digital for Nature’ call
- Biodiversity Meets Data - BMD
- BMD provides high-throughput biodiversity monitoring solutions
- BMD is co-designed with you
- BMD workshops at this event

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Digital for nature

HORIZON-CL6-2024-BIODIV-01-2

Topic Call for proposal

BMD Biodiversity Meets Data

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- Topic description
- Destination
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- Start submission
- Topic Q&As

General information

Programme
Horizon Europe (HORIZON)

Budget overview

Call
Biodiversity and ecosystem services (HORIZON-CL6-2024-BIODIV-01)

Type of action
HORIZON-IA HORIZON Innovation Actions

Type of MGA
HORIZON Action Grant Budget-Based [HORIZON-AG]

Closed

Deadline model
single-stage

Opening date
17 October 2023

Deadline date
22 February 2024 17:00:00 Brussels time

BMD Biodiversity Meets Data

The BMD consortium - 14 partners

1	STICHTING NATURALIS BIODIVERSITY CENTER	NL	Coordinator
2	ROYAL BOTANIC GARDEN EDINBURGH	UK	Partner
3	AGENTSCHAP PLANTENTUIN MEISE	BE	Partner
4	HELMHOLTZ-ZENTRUM FUR UMWELTFORSCHUNG GMBH	Germany	Partner
5	E-SCIENCE EUROPEAN INFRASTRUCTURE FOR BIODIVERSI	Spain	Partner
6	PENSOFT PUBLISHERS	BG	Partner
7	EUROSITE THE EUROPEAN LAND CONSERVATION NETWOI	NL	Partner
8	TARTU ULIKOOL	EE	Partner
9	STICHTING CATALOGUE OF LIFE	NL	Partner
10	DIETHNES PANEPISTIMIO ELLADOS	EL	Partner
11	SENCKENBERG GESELLSCHAFT FUR NATURFORSCHUNG	DE	Partner
12	UMWELTBUNDESAMT GESELLSCHAFT MIT BESCHRANKTE	AT	Partner
13	CONSIGLIO NAZIONALE DELLE RICERCHE	IT	Partner
14	SIB SWISS INSTITUTE OF BIOINFORMATICS	CH	Associated

Represented RIs and Projects through BMD partners

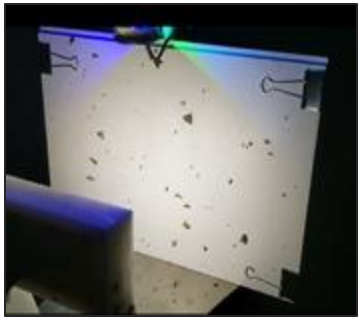
contributes to destination “biodiversity and ecosystem services” of the EU Green Deal

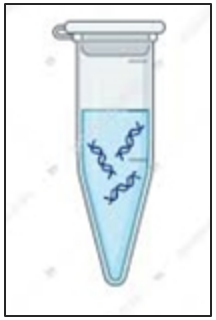
In line with the objectives of the EU biodiversity strategy for 2030 BMD will contribute to:

1. **Plan, manage and expand protected areas** and improve the conservation status of species and habitats based on up-to-date knowledge and solutions;
2. to **understand and address drivers of biodiversity decline**;
3. **mainstream biodiversity, ecosystem services**, including through the development of Nature-based Solutions.

Expected Outcomes (EO)

1. A **better monitoring of biodiversity** in the EU by high-throughput methods (e-DNA, sound/image/spectral analysis, use of mobile platforms, ...) **leading to a better implementation of the Nature Directives** (i.e. Birds Directive, Habitats Directive, Water Framework Directive and Marine Strategy Framework Directive).





Expected Outcomes (EO)

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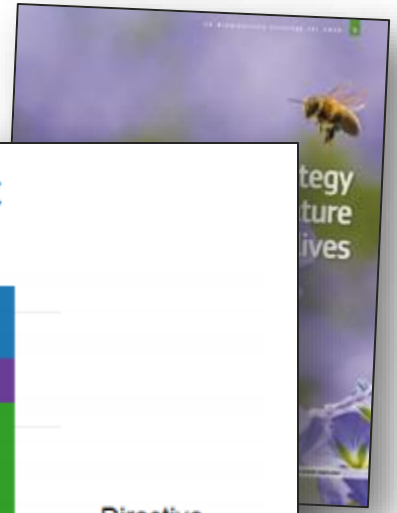

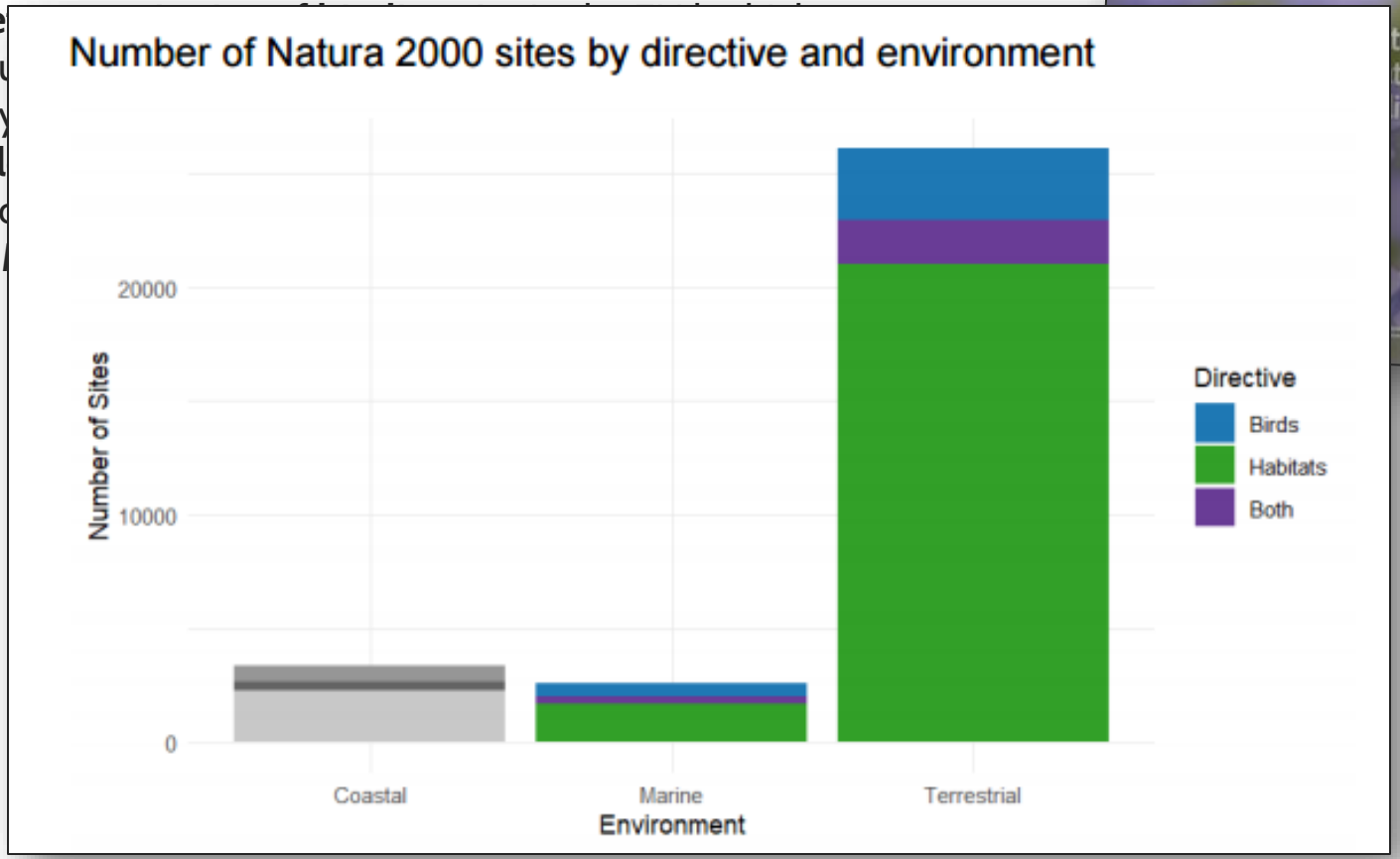

Expected Outcomes (EO)

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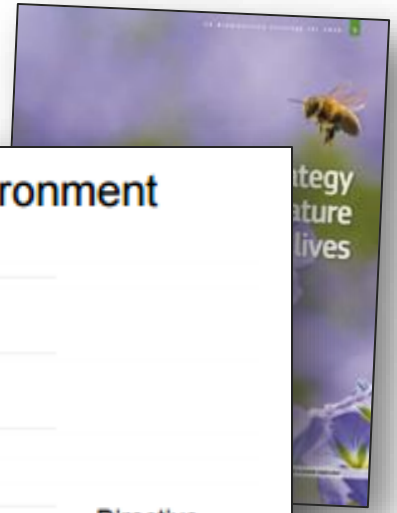

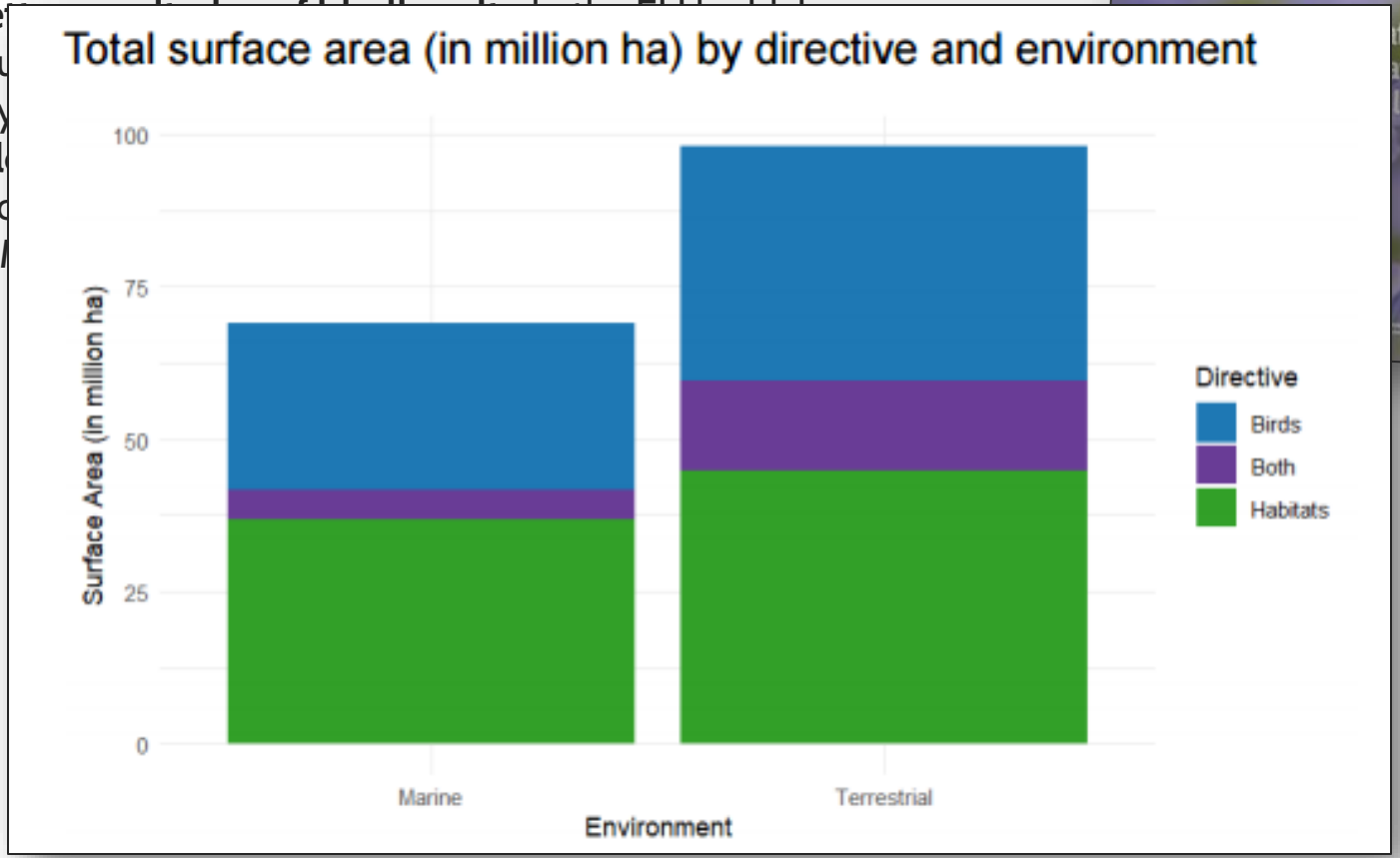

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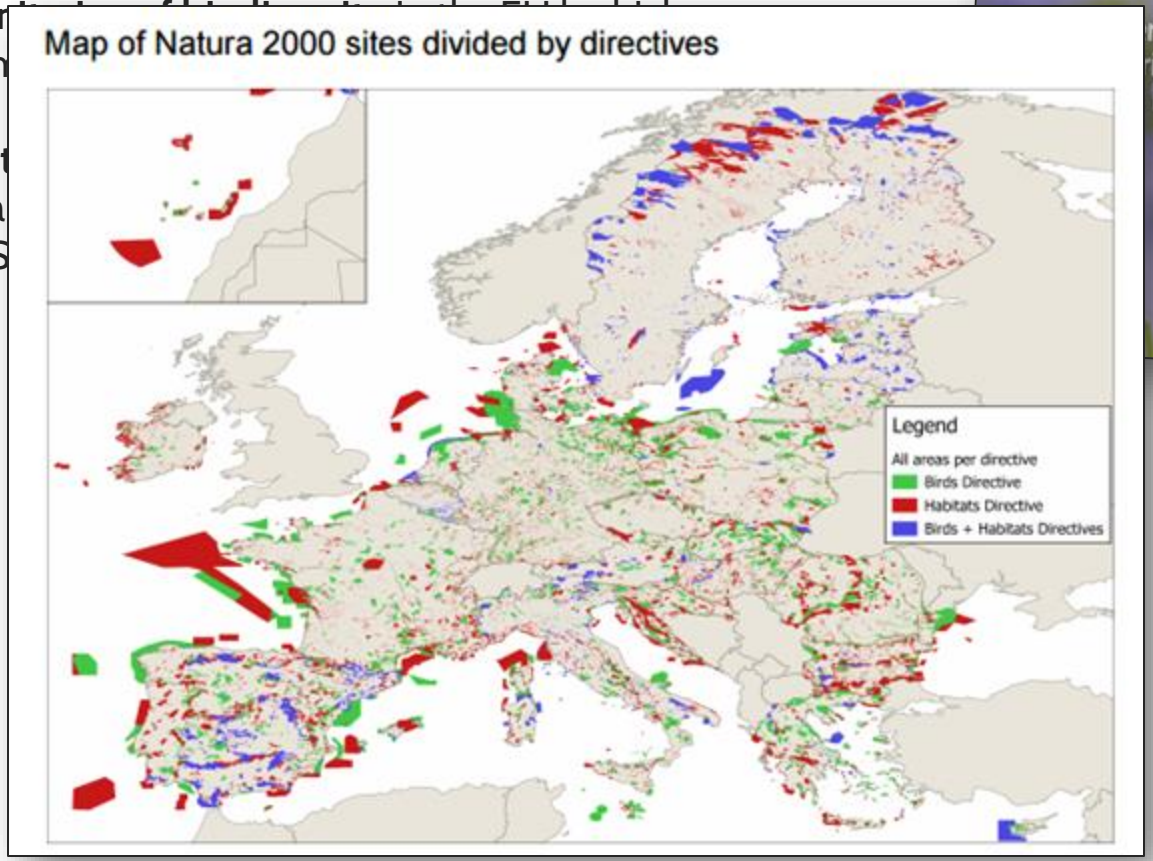


Expected Outcomes (EO)

1. A **better monitoring of biodiversity** in the EU by high-throughput methods (e-DNA, sound/image/spectral analysis, use of mobile platforms, ...) **leading to a better implementation of the Nature Directives** (i.e. Birds Directive, Habitats Directive, Water Framework Directive and Marine Strategy Framework Directive).

2. A **better understanding of the state of nature** and of the **drivers of biodiversity loss**, a **better usage of existing data** and therefor to **reverse biodiversity loss and to restore and protect ecosystems**.

3. A more **complete view of the state of nature** and its evolution [...].

Expected Outcomes (EO)

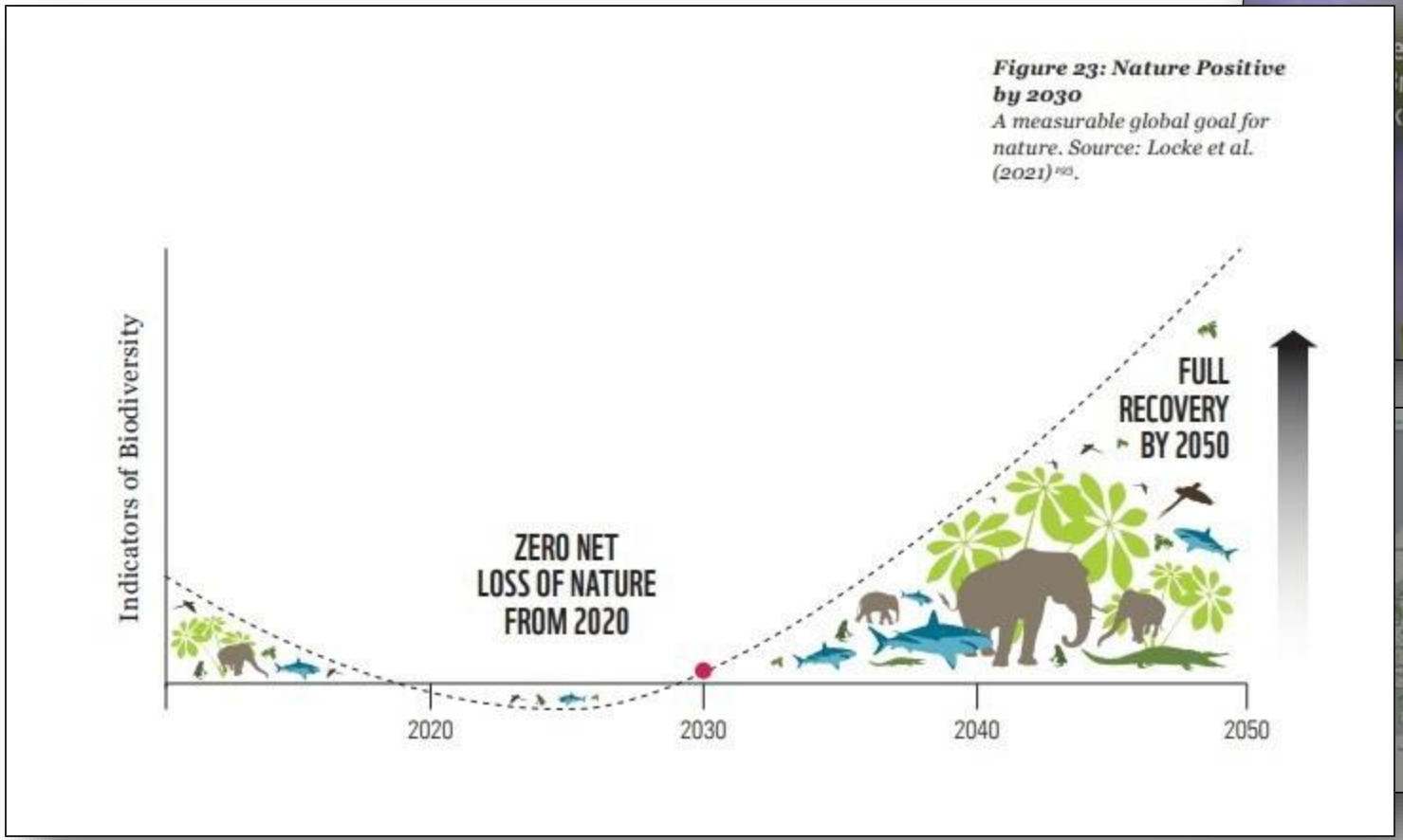
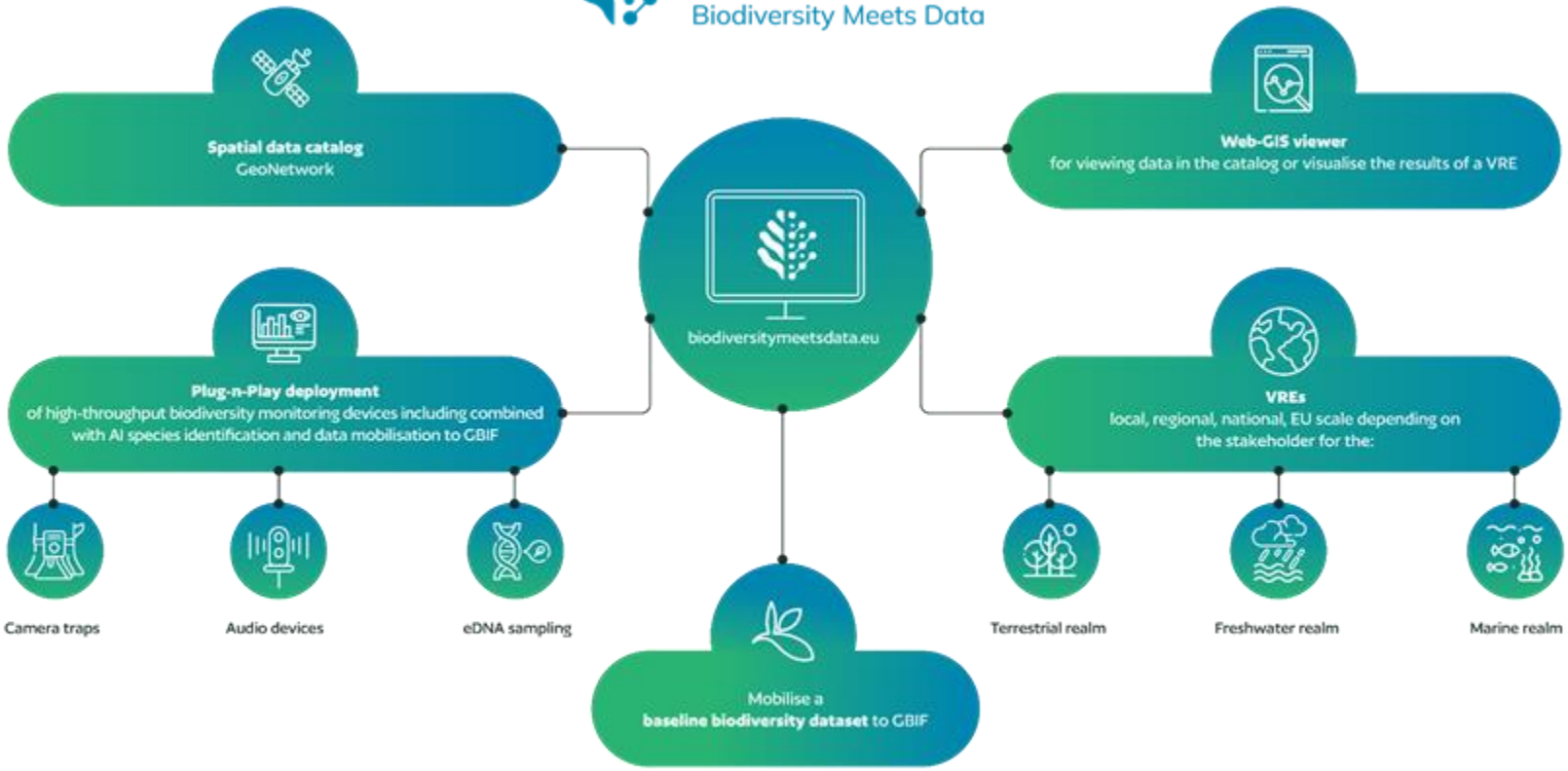


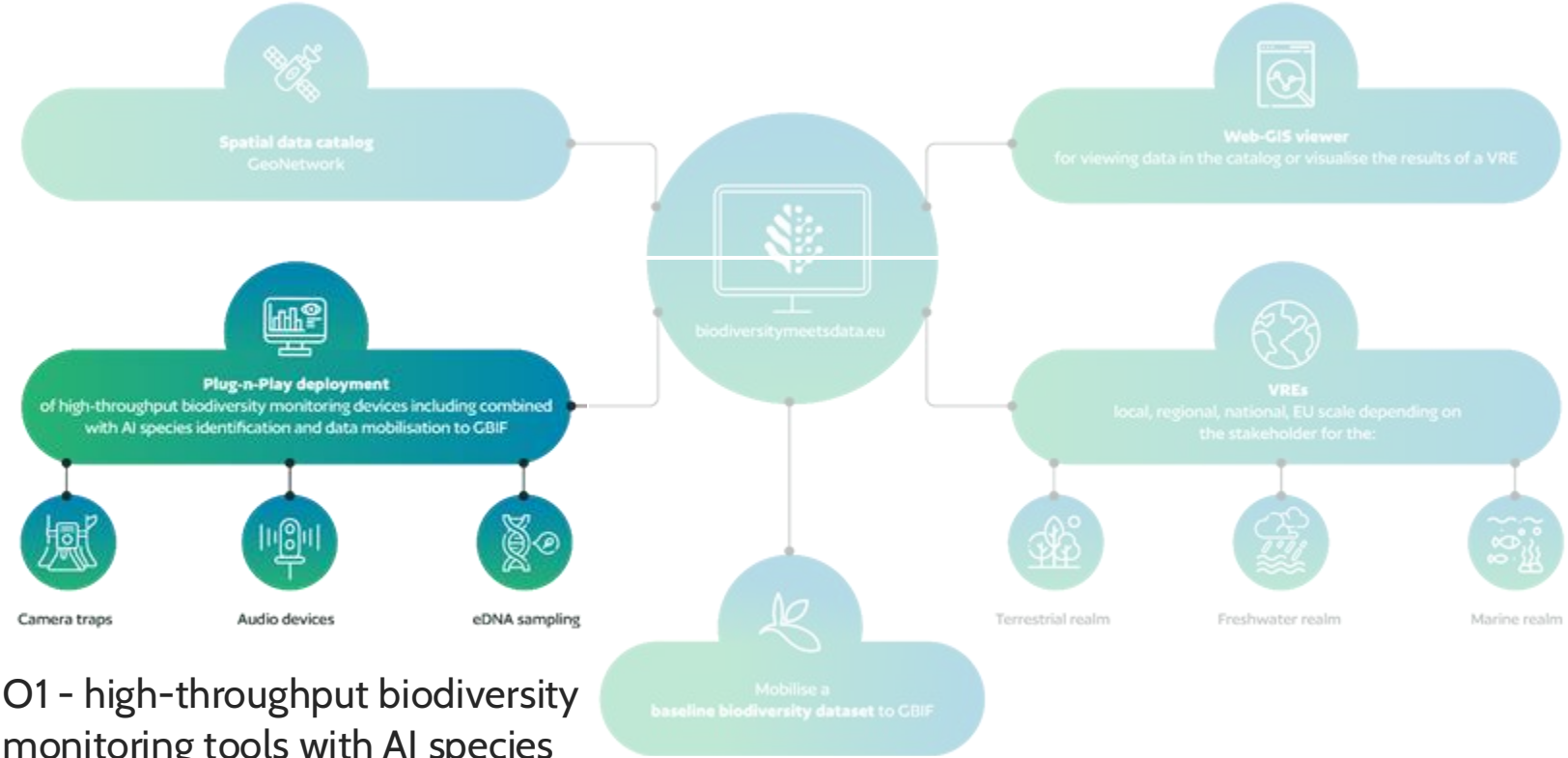
Figure 23: Nature Positive by 2030
A measurable global goal for nature. Source: Locke et al. (2021)[93].



March 2025

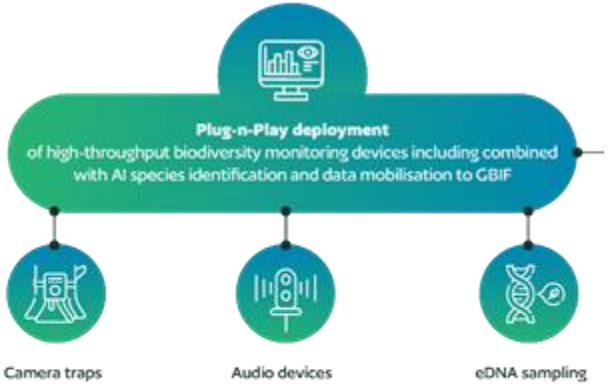
	Year 1												Year 2												Year 3												Year 4											
BMD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48

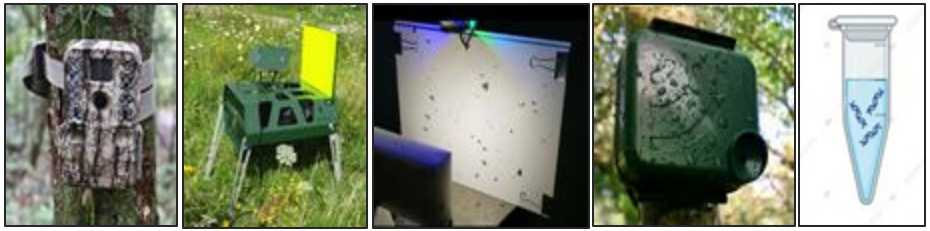
BMD - 7 Objectives i.r.t. the Expected Outcomes



O1 - high-throughput biodiversity monitoring tools with AI species identification services

BMD - 7 Objectives i.r.t. the Expected Outcomes





O1 high-throughput biodiversity monitoring tools with AI species identification services

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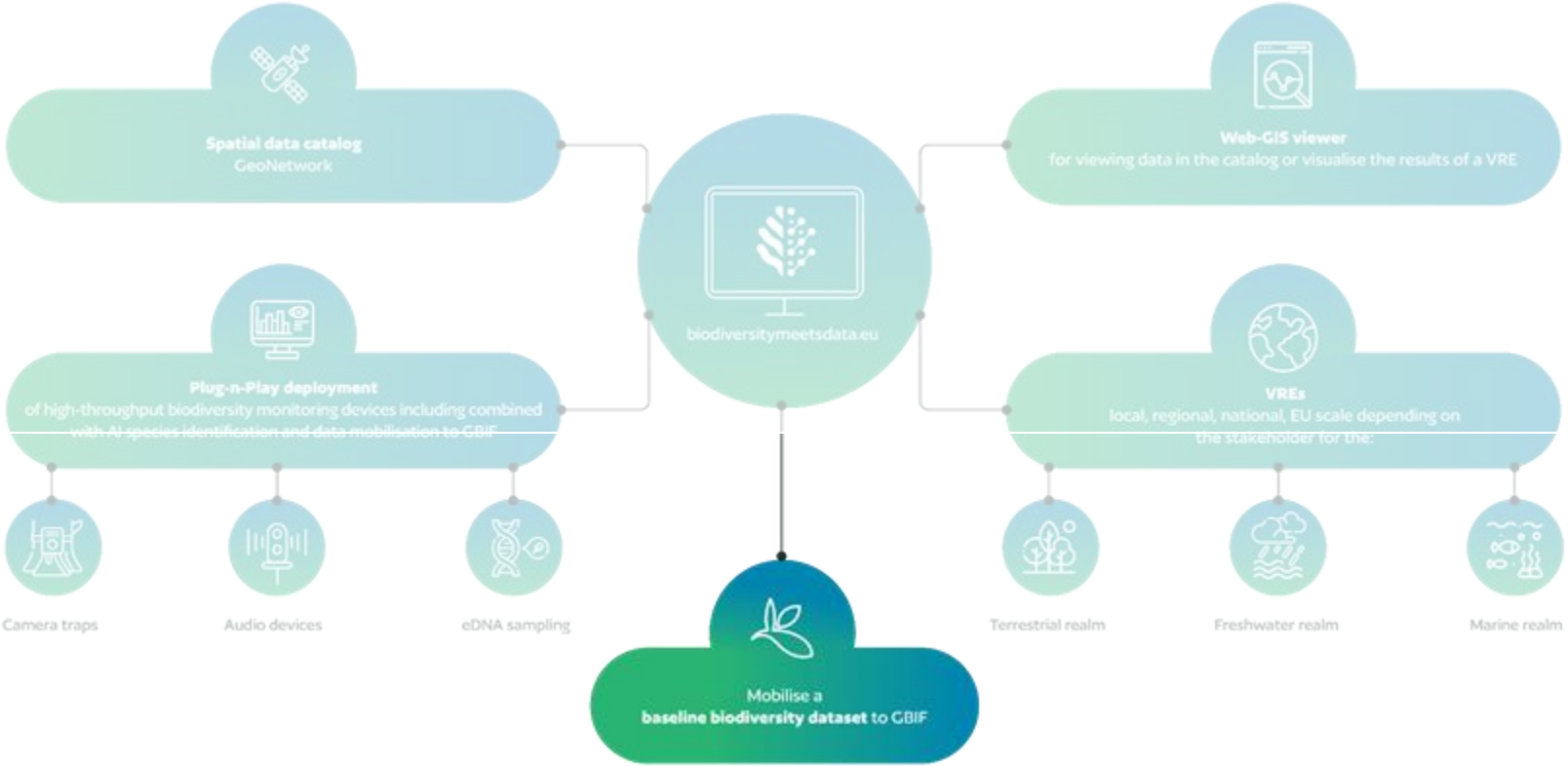


O2 - mobilise historical baseline and legacy biodiversity datasets

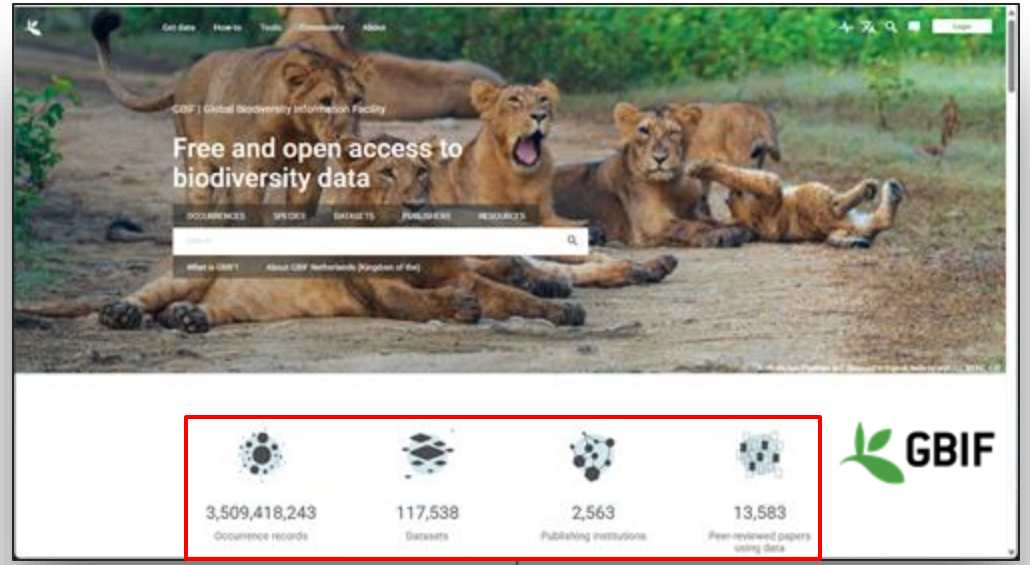
BMD - 7 Objectives i.r.t. the Expected Outcomes

Mobilisation of biodiversity data to the Global Biodiversity Information Facility – GBIF.org from:

1. Historical baseline assessments
2. Environmental Impact Assessments (EIAs)
3. N2000 designation reports
4. National checklists via CoL ChecklistBank
5. Etc.

O2 - mobilise historical baseline and legacy biodiversity datasets

BMD - 7 Objectives i.r.t. the Expected Outcomes

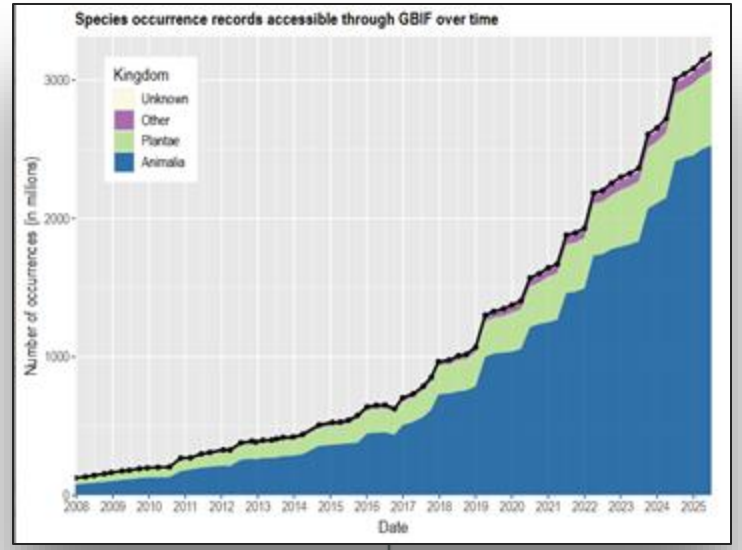


https://www.gbif.org/

Mobilise a **baseline biodiversity dataset** to GBIF

O2 - mobilise historical baseline and legacy biodiversity datasets

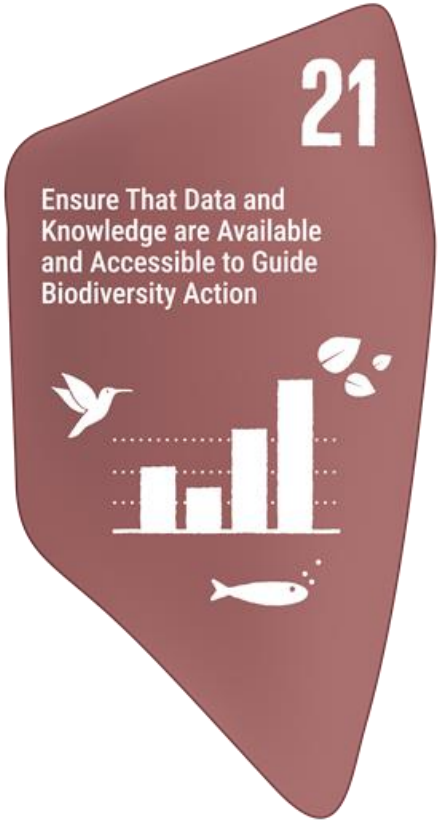
BMD - 7 Objectives i.r.t. the Expected Outcomes



O2 - mobilise historical baseline and legacy biodiversity datasets

BMD - 7 Objectives i.r.t. the Expected Outcomes

Kunming - Montreal
GLOBAL BIODIVERSITY FRAMEWORK



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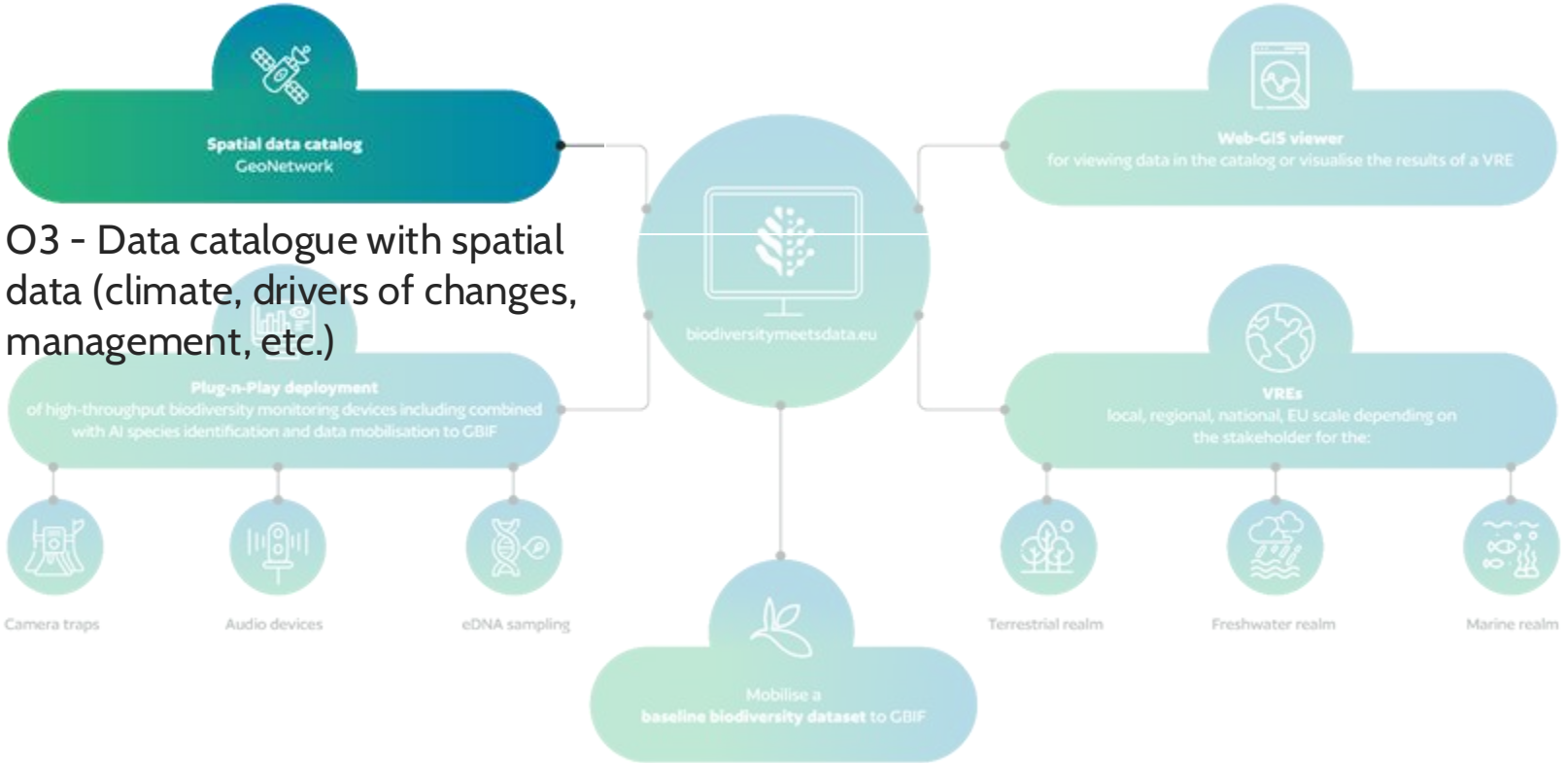
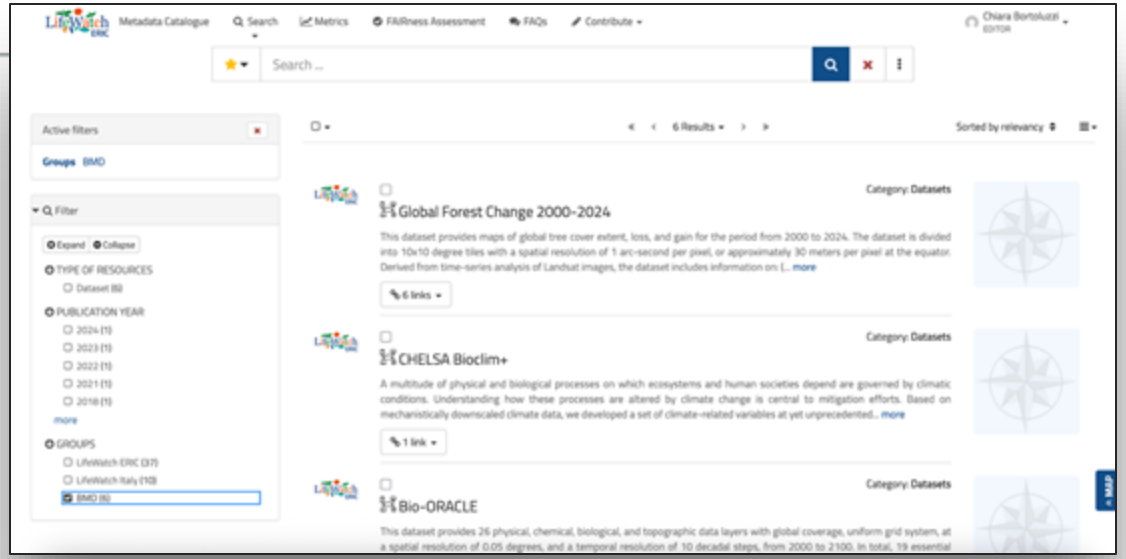


O3 - Data catalogue with spatial data (climate, drivers of changes, management, etc.)

BMD - 7 Objectives i.r.t. the Expected Outcomes

Spatial data catalog
GeoNetwork

O3 - Data catalogue with spatial data (climate, drivers of changes, management, etc.)



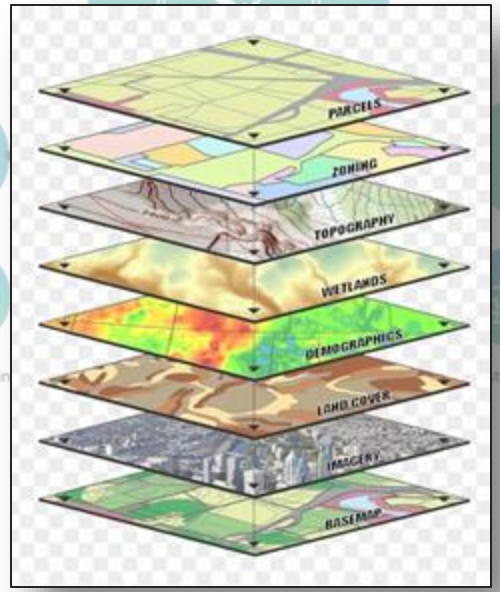
BMD - 7 Objectives i.r.t. the Expected Outcomes

Spatial data catalog

Web-GIS viewer

the results of a VRE

O4 - Pipeline to harmonise spatio-temporal and taxonomic data across space-time-taxonomy



Plug-n-Play deployment

of high-throughput biodiversity monitoring devices including combined with AI species identification and data mobilisation to GBIF

Camera traps

Audio devices

eDNA samplin

VREs

local, regional, national, EU scale depending on the stakeholder for the:

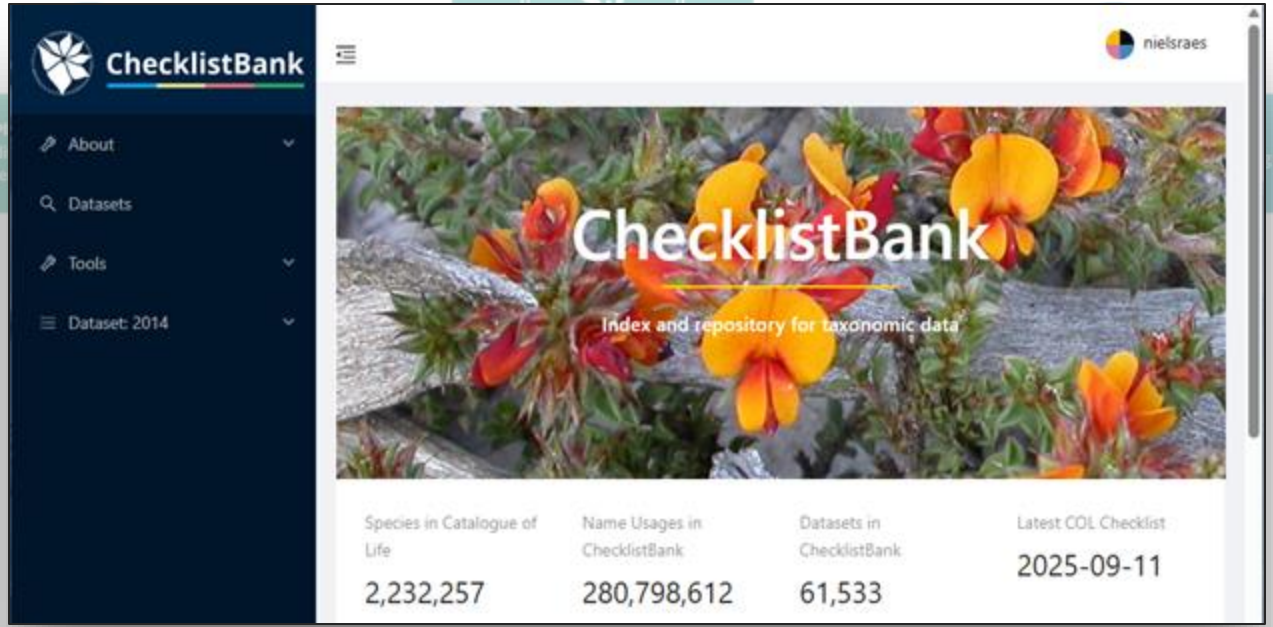
trial realm

Freshwater realm

Marine realm

BMD - 7 Objectives i.r.t. the Expected Outcomes

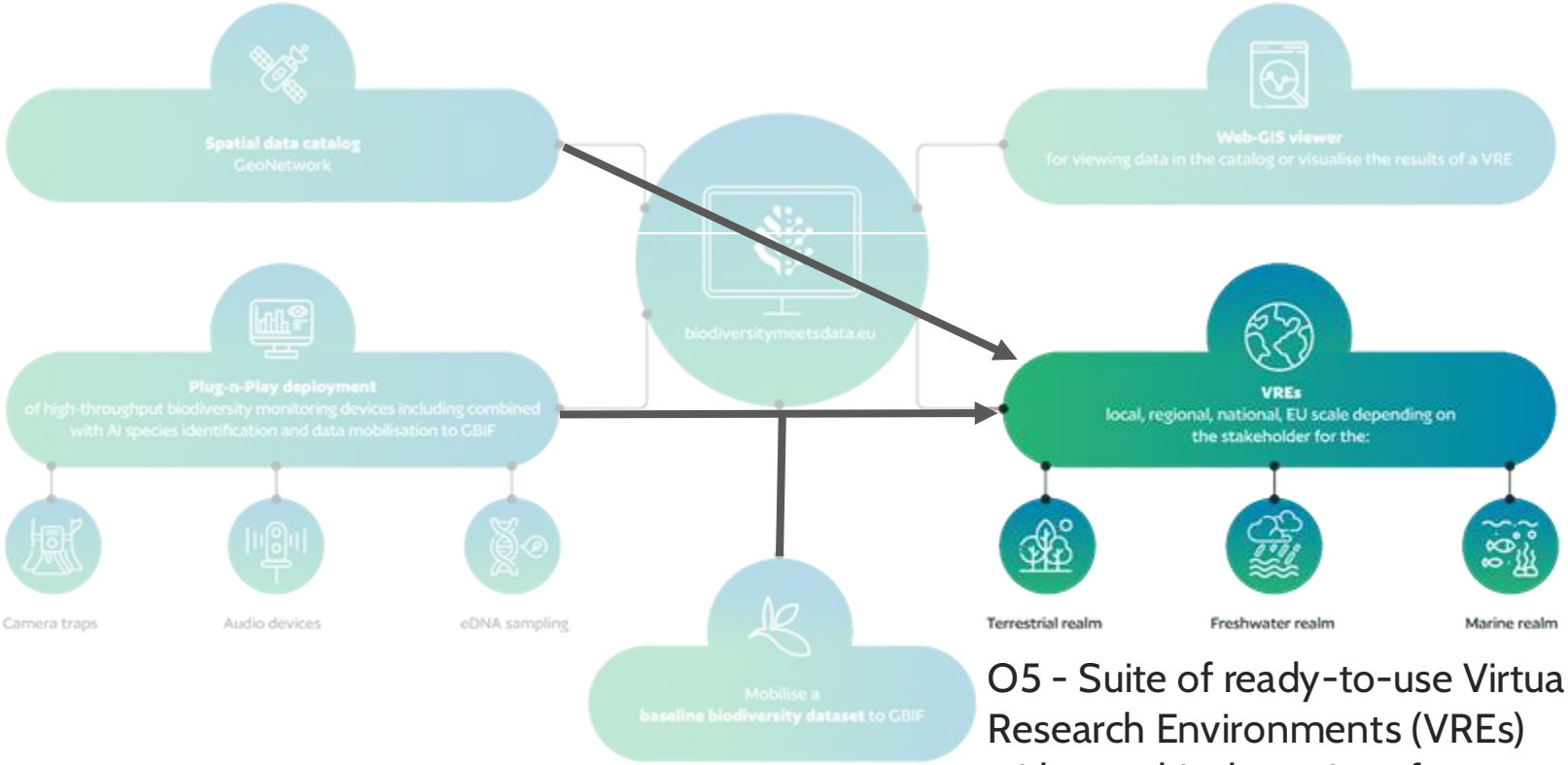
O4 - Pipeline to harmonise spatio-temporal and taxonomic data across space-time-taxonomy



Catalogue of Life

BMD Biodiversity Meets Data

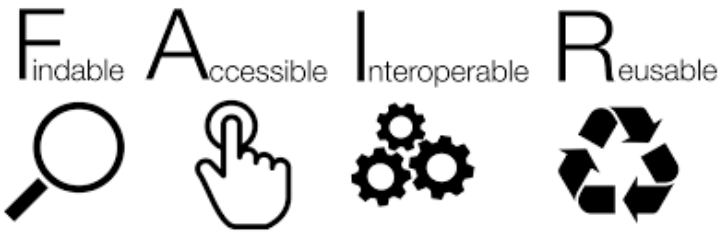
BMD - 7 Objectives i.r.t. the Expected Outcomes



O5 - Suite of ready-to-use Virtual Research Environments (VREs) with graphical user interfaces

BMD - 7 Objectives i.r.t. the Expected Outcomes

- VREs cover the three realms and all spatial scales.
- Users can define their own analyses, e.g.
  - trend analysis of certain species in a N2000 area,
  - Show all GBIF records from my N2000 site with a time-slider,
  - identification of drivers of change,
  - predicted impacts of climate and land use change,
  - Species Distribution Models (SDMs)
  - etc.
- Input data, analysis workflows and results will be FAIR.



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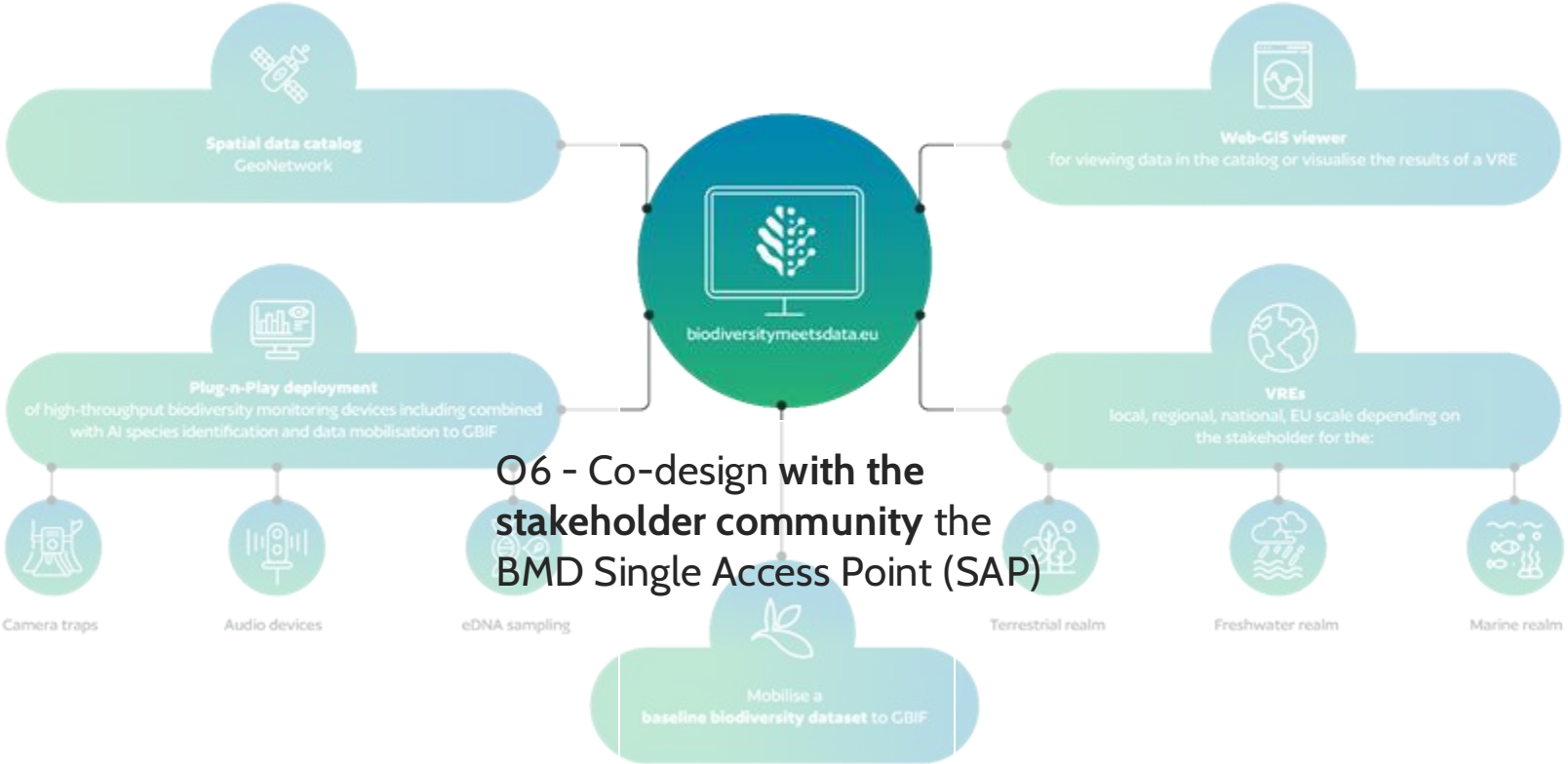
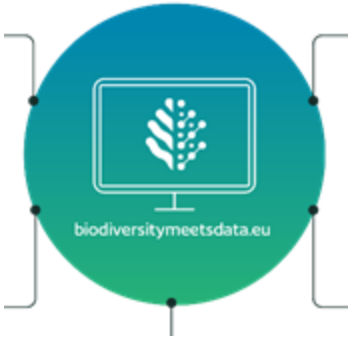


O6 - Co-design **with the stakeholder community** the BMD Single Access Point (SAP)

BMD - 7 Objectives i.r.t. the Expected Outcomes

BMD stakeholders:

1. **Public, private and third-sector managers of natural resource sites** with responsibility for site-level strategic delivery of biodiversity conservation.
2. **Government agencies** at multiple levels (Europe, national and regional) with responsibility for reporting under the Nature Directives.
3. **Policymakers** in the domain of the EU Green Deal, EU biodiversity strategy for 2030 and the EU nature restoration regulation.
4. **Private sector** with reporting obligations under the Corporate Sustainability Reporting Directive.
5. **Academia** in the Natural and Life Science domains.



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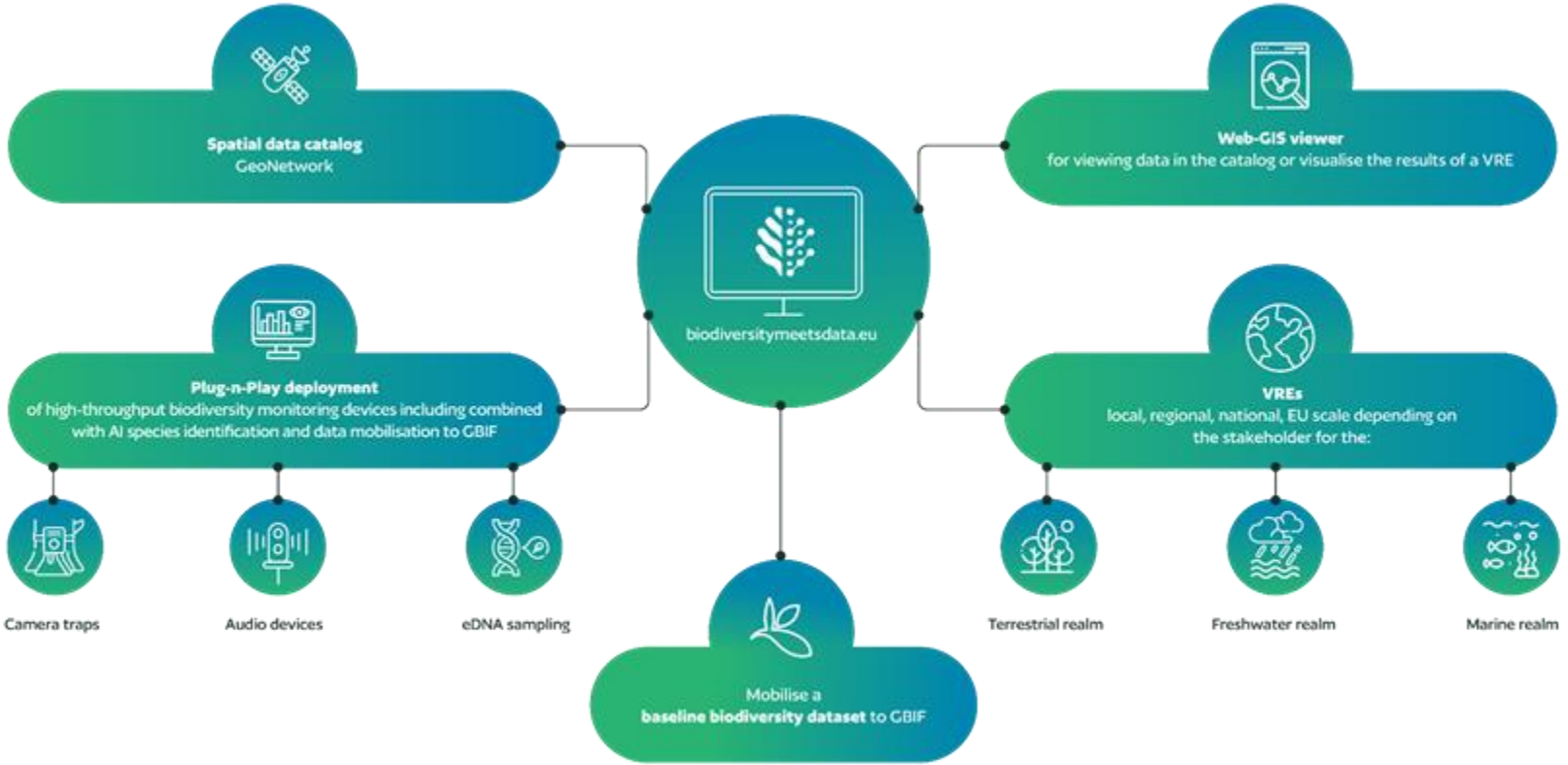


O7 - Develop extensive training and capacity building material and training workshops

Key Exploitable Results

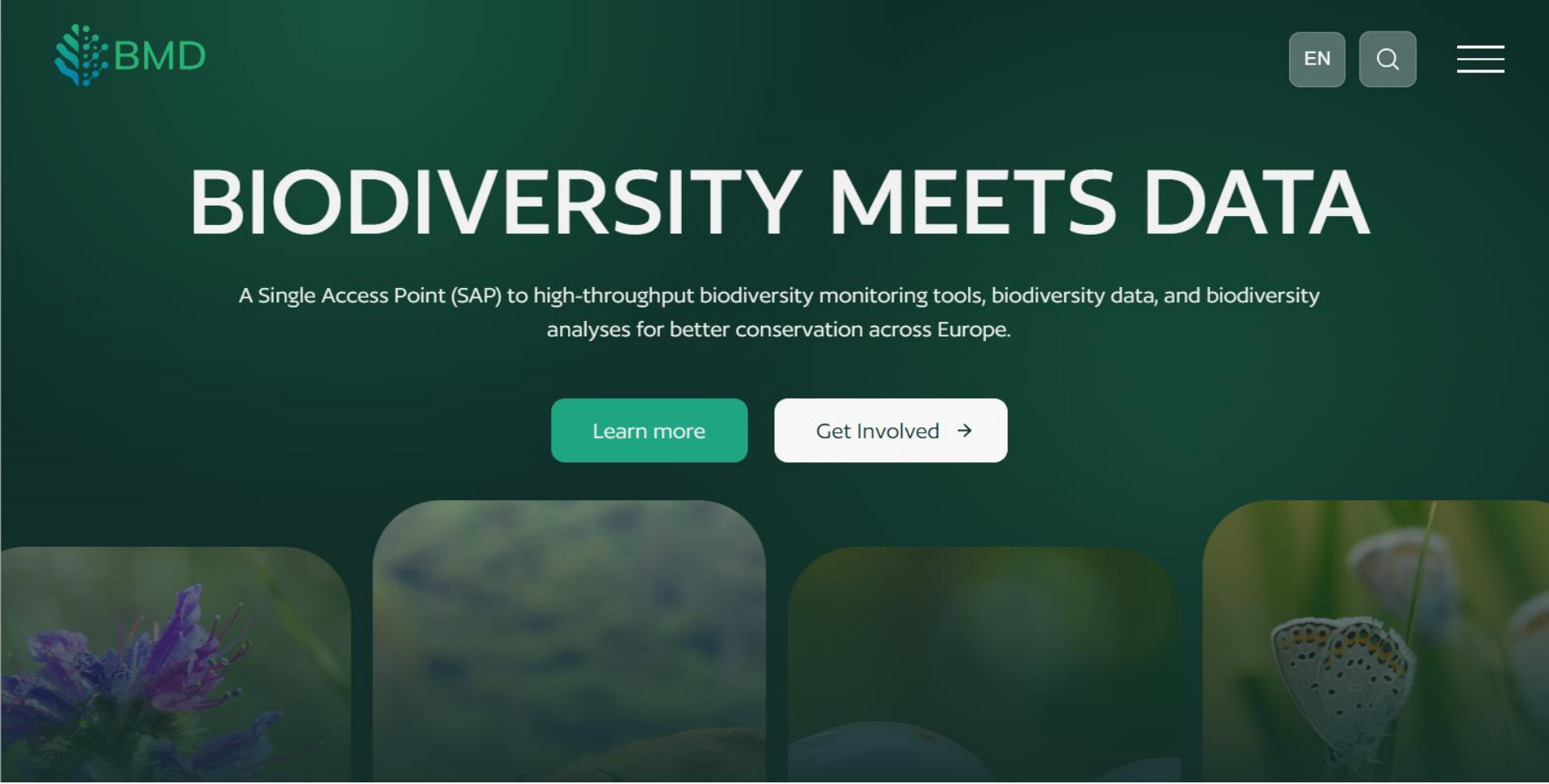
Key Exploitable Result	Target audience	Exploitation routes
Plug-n-Play framework for high-throughput biodiversity monitoring (image/sound/eDNA)	Public, private and third-sector managers of N2000 sites	Framework tested through a workshop where 10 camera-traps and 10 audio-moths are deployed, and 10 eDNA samples are taken. Deployment of high-throughput biodiversity monitoring devices is captured for online tutorials and manuals.
BMD Data Catalogue	Public, private and third-sector managers of N2000 sites; Government agencies; Policymakers	Protocols for data inclusion are operational. Manuals for use are made available to the target audience.
Suite of VREs for biodiversity monitoring and analyses	Public, private and third-sector managers of N2000 sites; Government agencies; Policymakers	Each VRE is co-designed with stakeholder representatives and training material is developed alongside VRE development. Each release of a VRE with its user documentation is announced via BMD's channels.
Web-GIS data viewer	Public, private and third-sector managers of N2000 sites; Government agencies; Policymakers	The web-GIS data viewer will be exploited as part of the BMD Single Access Point.
BMD Single Access Point	Public, private and third-sector managers of N2000 sites; Government agencies; Policymakers	SAP co-designed through 3 stakeholder workshops to ensure it meets user requirements.Training provided on the use of the SAP to ensure stakeholders can use the technology the SAP delivers. Creation of videos, presentations and roadmaps to the SAP illustrating its usefulness.

BMD Impacts

Biodiversity Meets Data

1. Species and habitats are monitored across their entire distribution ranges at a much higher density in space and time and at a much lower cost.
2. Understanding of the drivers of biodiversity decline results in effective restoration measures, and better management, planning and expansion of protected areas in Europe.
3. By making all relevant data, tools and services through a Single Access Point, enables mainstreaming biodiversity and ecosystem services.
4. BMD can also be used by the private sector to disclose information on the impacts and dependencies of business activities on biodiversity and natural resources.

Funded by
the European Union

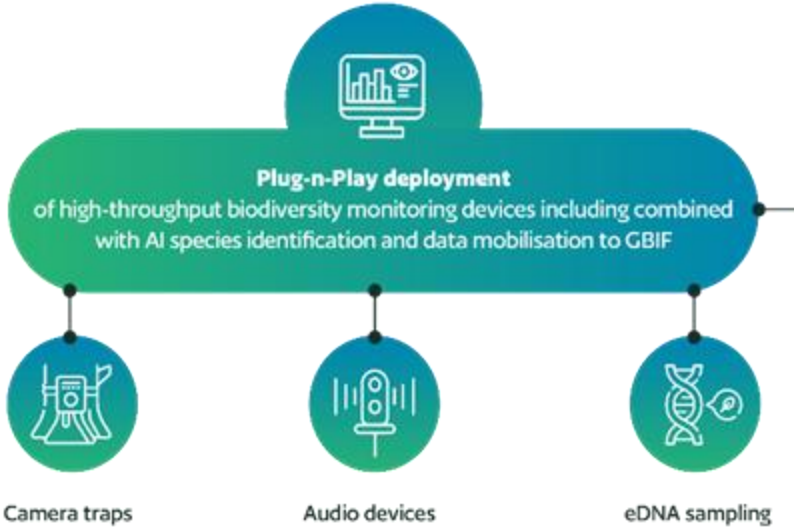


https://bmd-project.eu/

BMD
Biodiversity Meets Data

High-throughput biodiversity monitoring

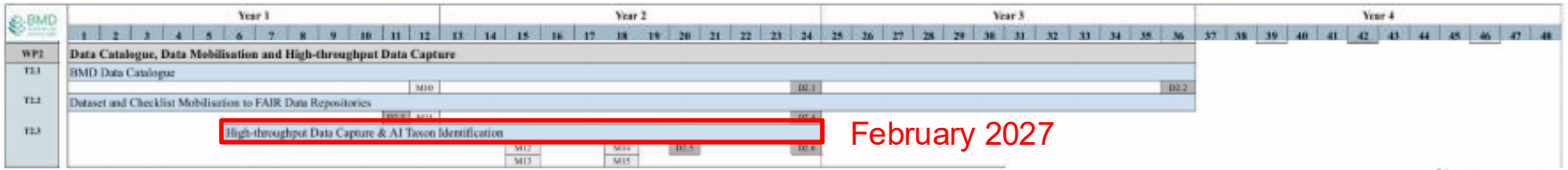
High-throughput biodiversity monitoring



Key Exploitable Result
Plug-n-Play framework for high-throughput biodiversity monitoring (image/sound/eDNA)

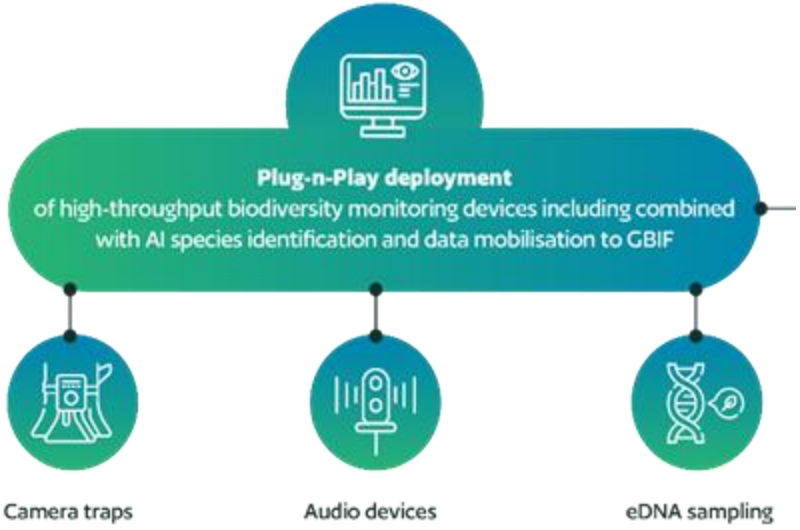
March 2025

August 2025



February 2027

High-throughput biodiversity monitoring



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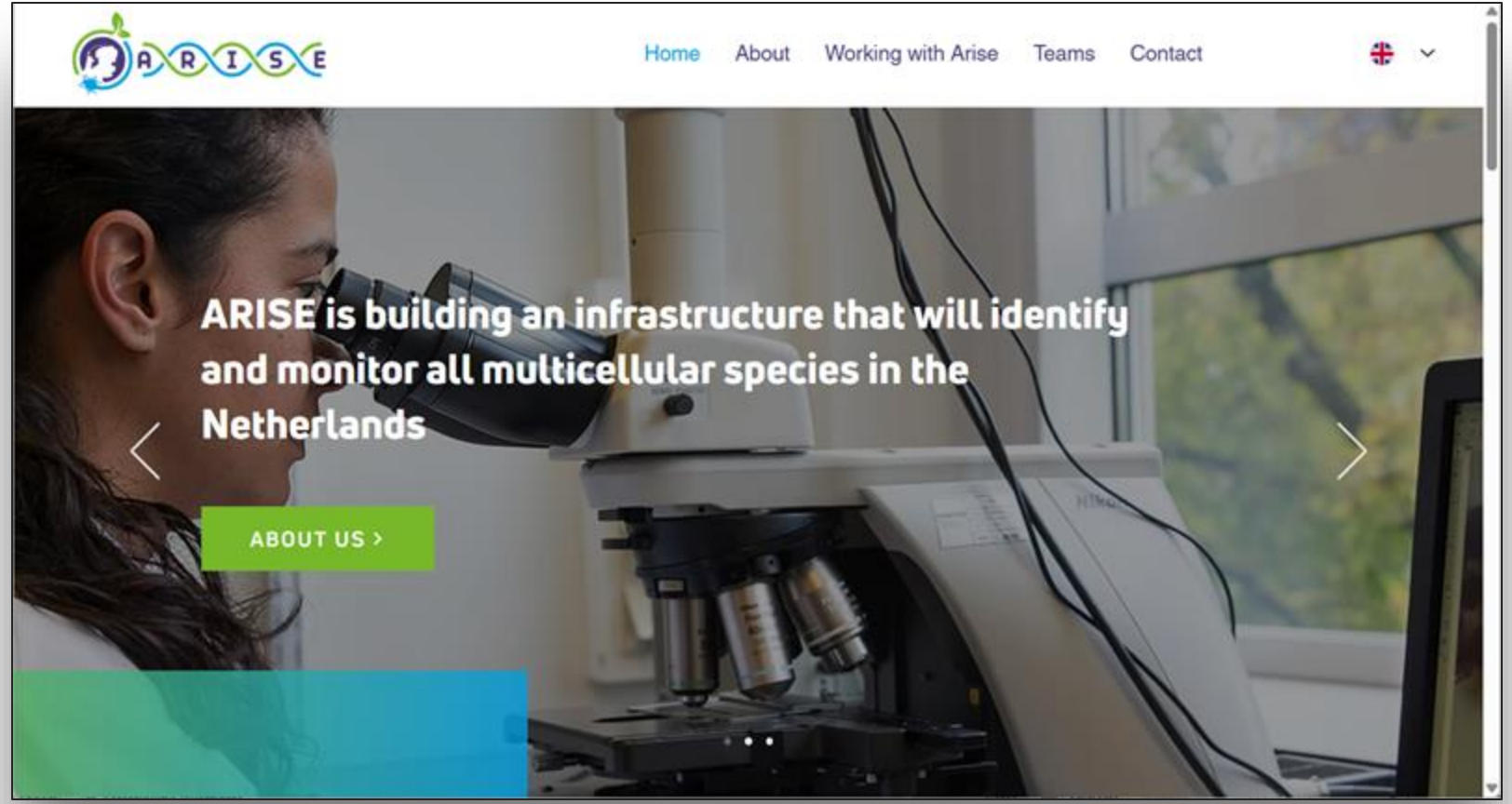
High-throughput biodiversity monitoring



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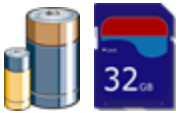
High-throughput biodiversity monitoring

Traditional monitoring with cameras and audio devices



Camera with batteries & SD cards

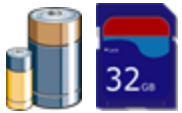
Manual data collection

Manual transfer to storage

Manual species recognition

High-throughput biodiversity monitoring

Traditional monitoring with cameras and audio devices



Camera with batteries & SD cards

Manual data collection

Manual transfer to storage

Manual species recognition

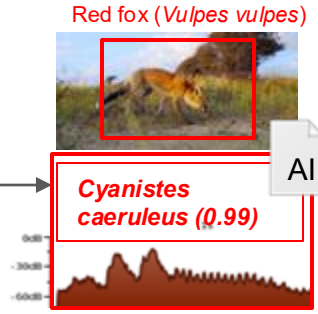
Autonomous monitoring with cameras and audio devices

Camera with sola panel & 4G data transfer

Automated upload to server

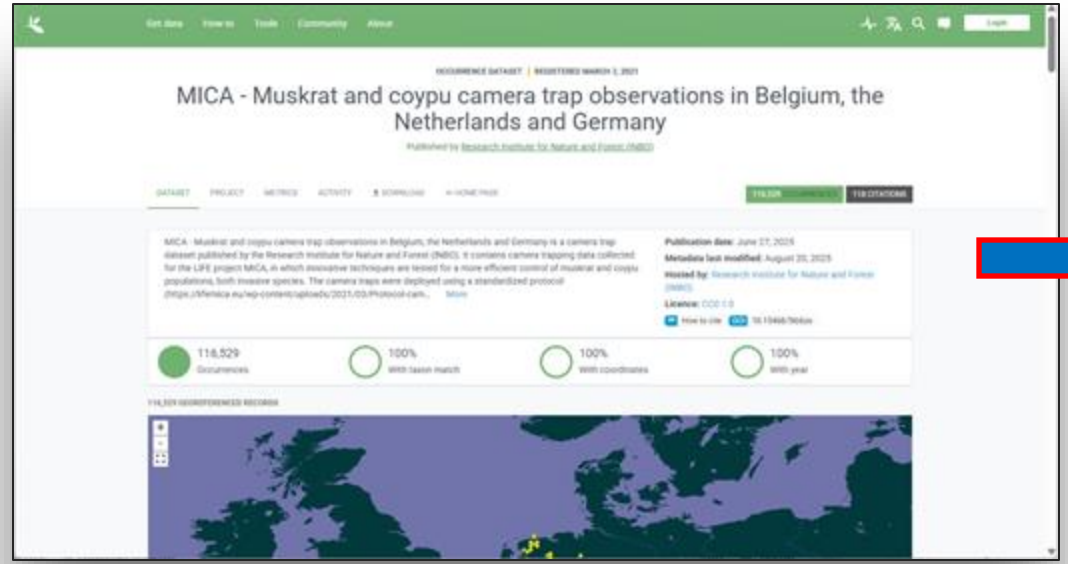
Remote control over cameras and data upload

Data archiving & long-term storage



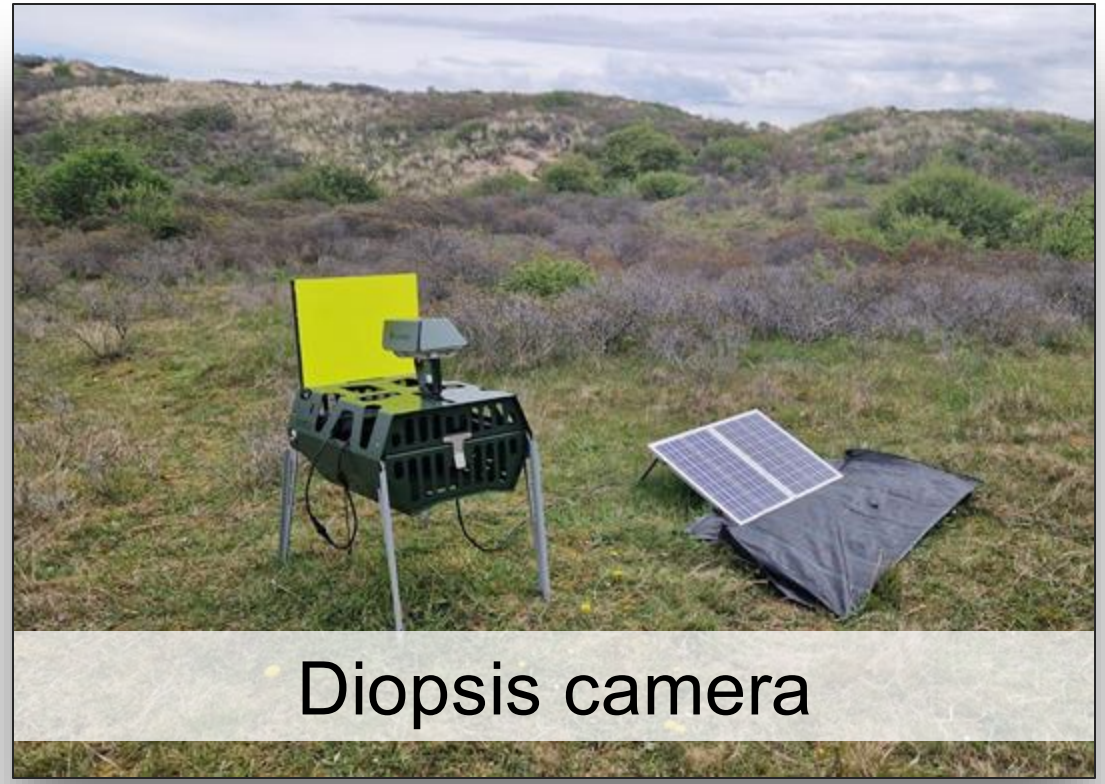
Automated species recognition with AI

High-throughput biodiversity monitoring



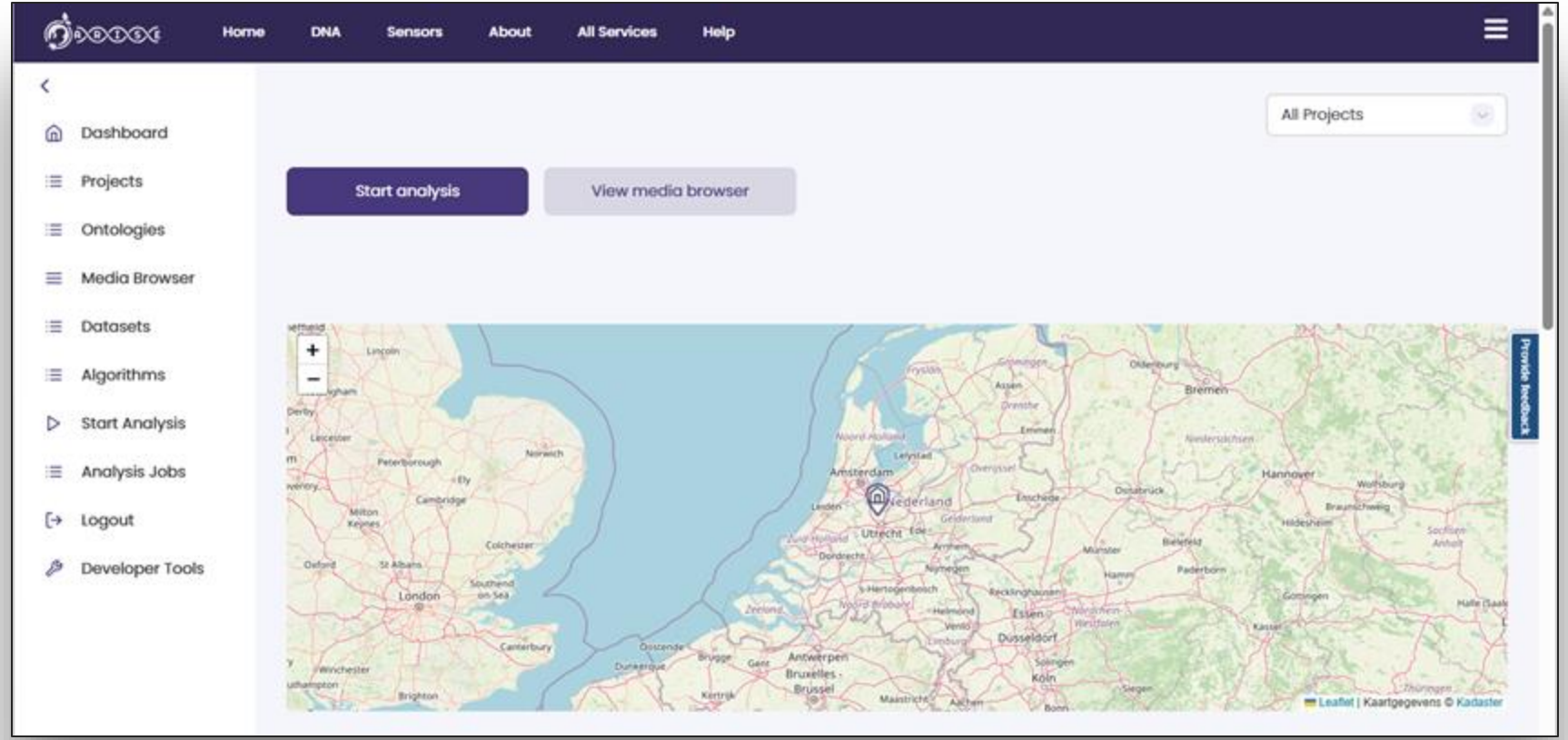
GBIF

High-throughput biodiversity monitoring



Diopsis camera

High-throughput biodiversity monitoring



eDNA sampling

Fields where eDNA can be applied:

- **Biodiversity monitoring**
- Detection of rare, endangered, or invasive species
- Water quality assessment
- Soil health monitoring
- Impact assessments for infrastructure projects (e.g., dams, wind farms)
- Agriculture and forestry (e.g., detection of crop pests, pathogens, and invasive plants as well as beneficial organisms such as pollinators or mycorrhizal fungi)
- Public health (e.g., wastewater-based epidemiology)

BMD
Biodiversity Meets Data

eDNA sampling

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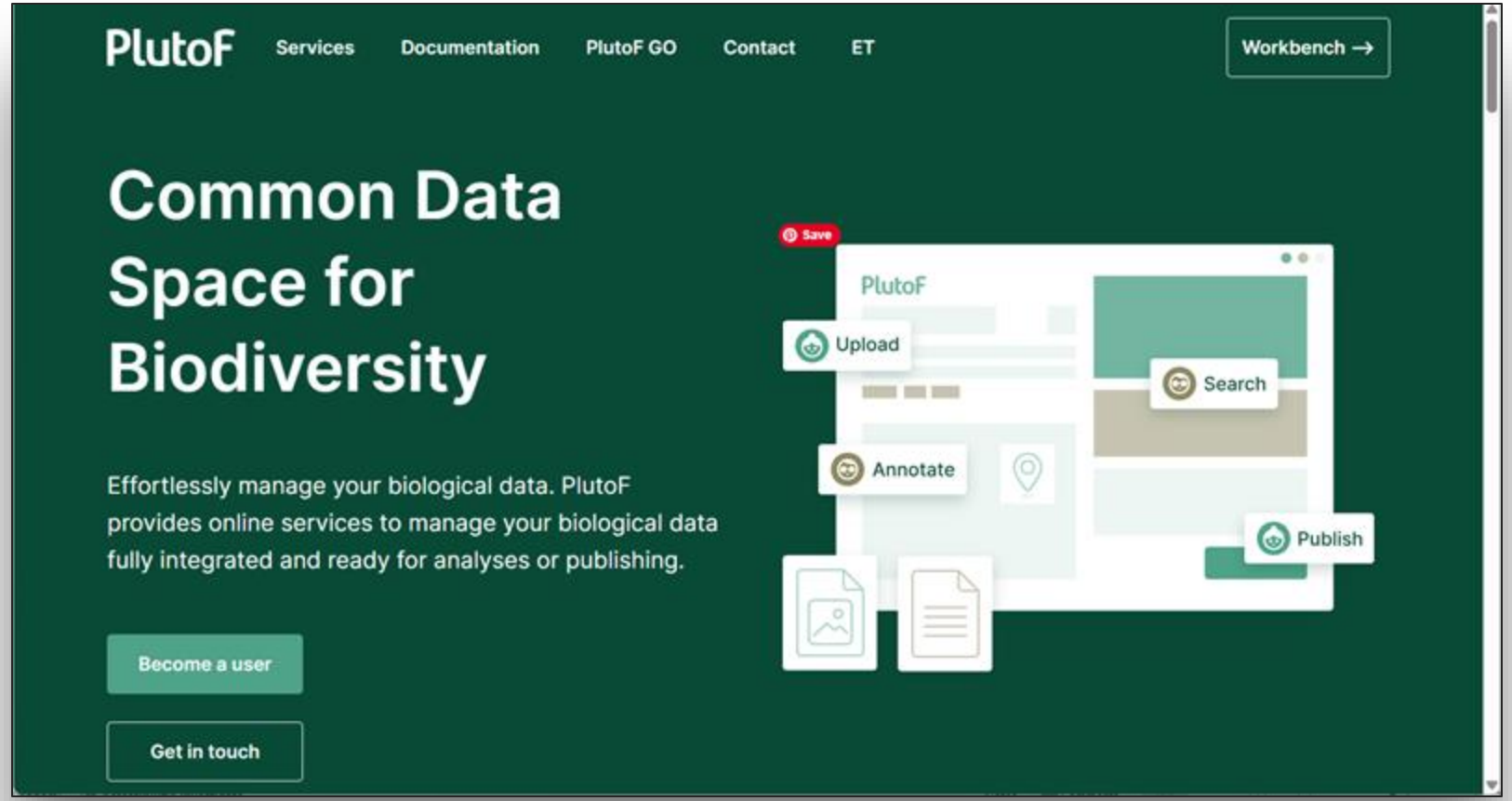

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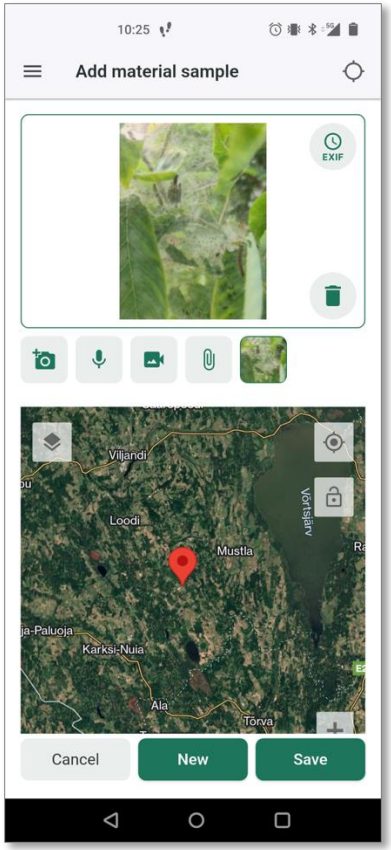
eDNA sampling

Collecting water samples

PlutoF GO app: registering samples in the field using QR codes

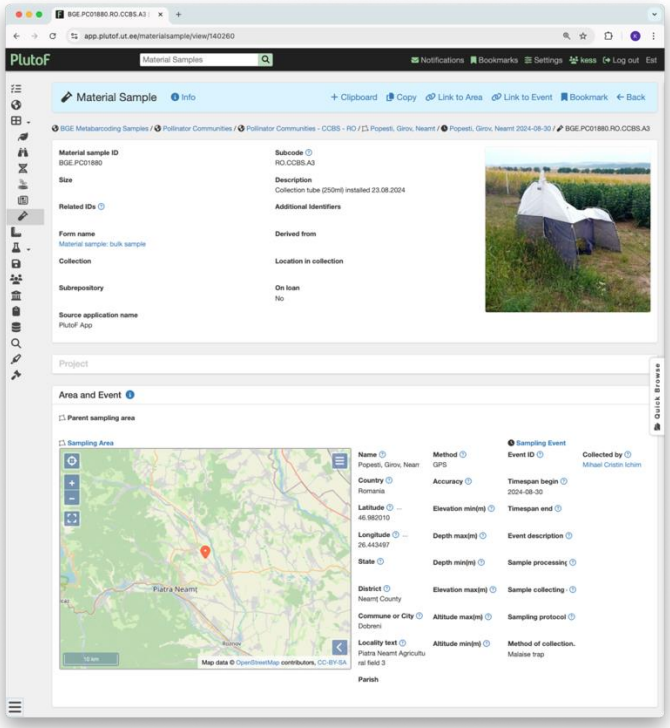


PlutoF

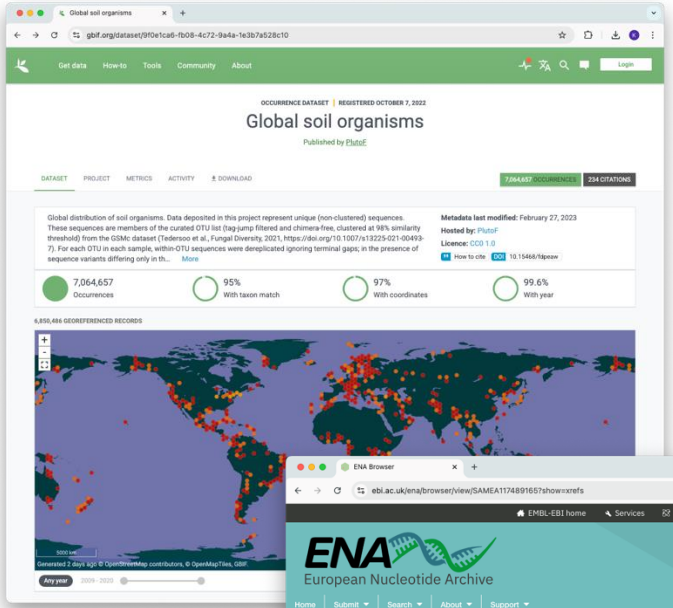
eDNA sampling

Porject results can be shared with GBIF, ENA, and other external repositories via RESTful APIs.

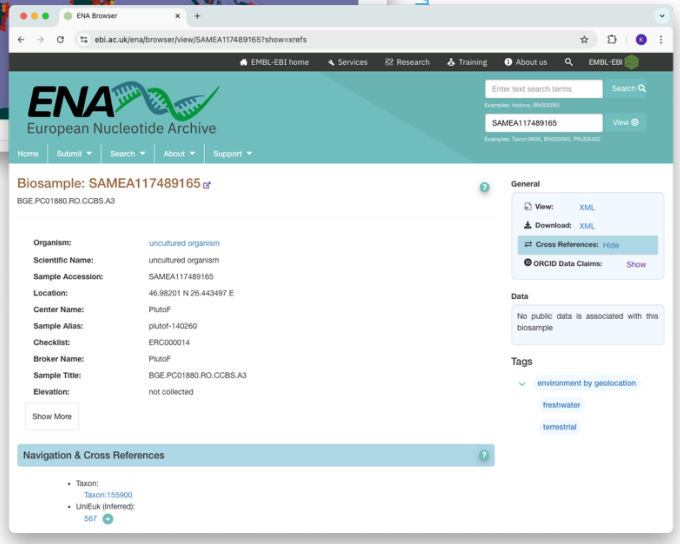
PlutoF



GBIF



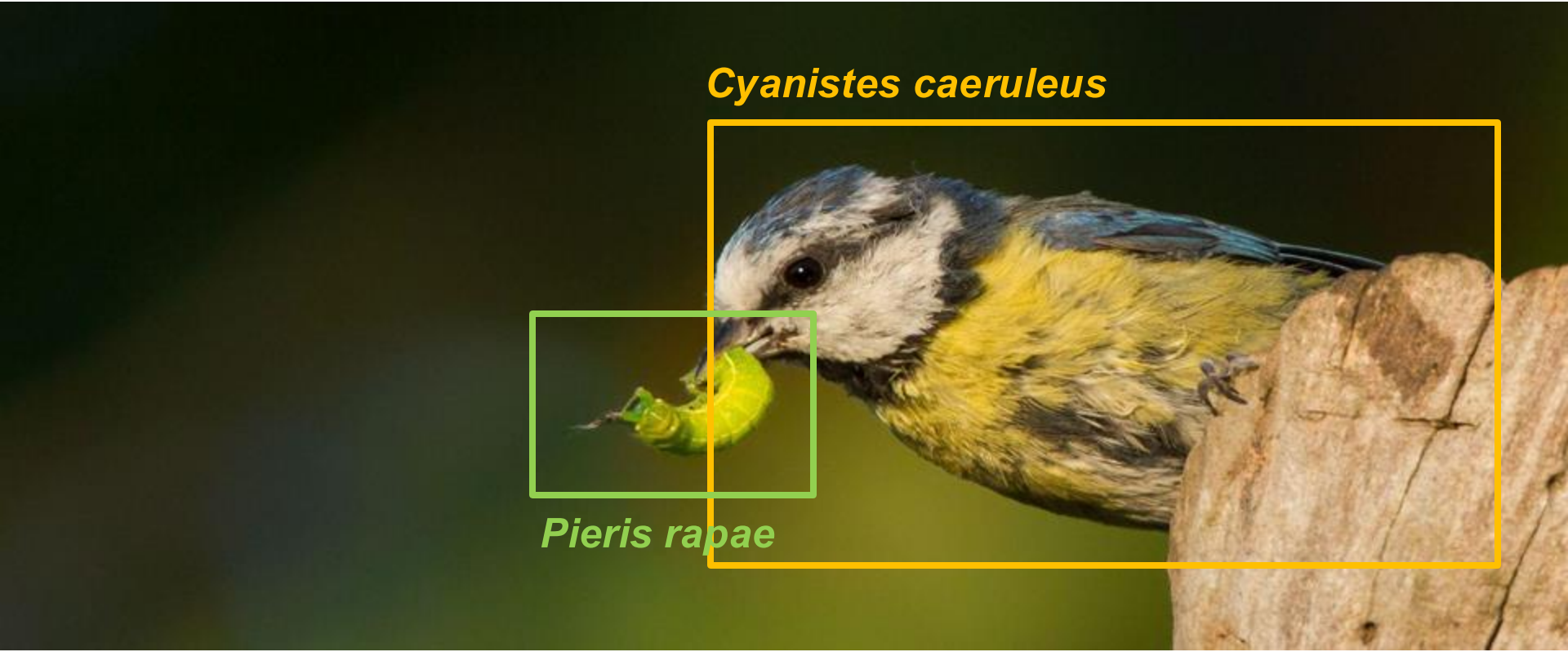
ENA/BioSamples



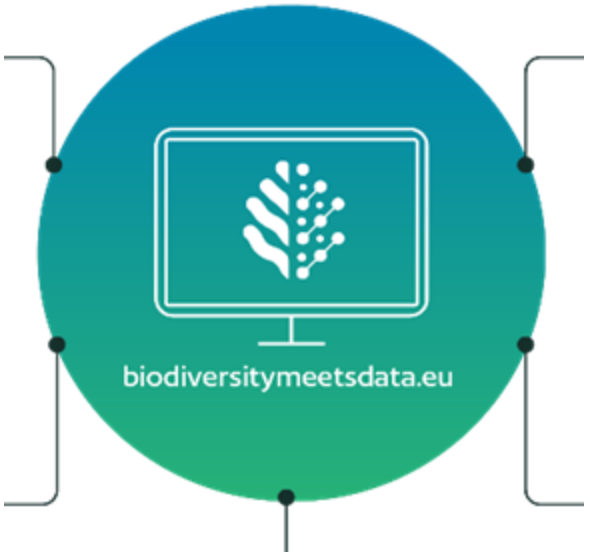
Other repositories

https://www.ebi.ac.uk/ena/browser/view/SAMEA117489165

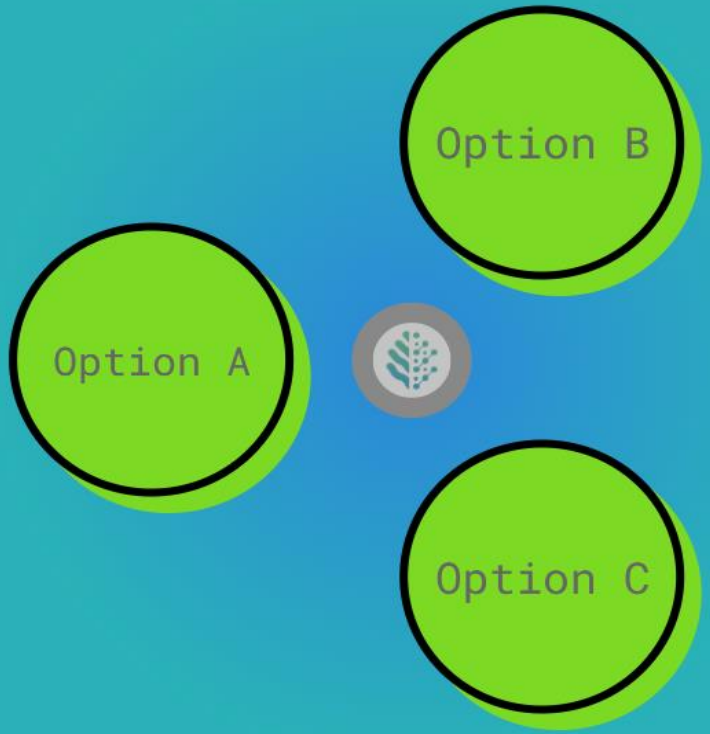
BMD is co-designed with you



BMD is co-designed with you



BMD SAP



https://bmd.lifewatch.eu/

We truly appreciate your feedback and the time you dedicate to filling out this questionnaire.

Option A *

- Select -

Option B *

- Select -

Option C *

- Select -

Additional comments

Submit Form

BMD workshops

15:00 - 17:00	**Session 2:** Biodiversity Meets Data	Chair: Wojciech Mróz, Eurosite • **Single Access Point for Biodiversity Data: User Stories Workshop -** Tami Wooldridge, Emma Bush, Royal Botanical Gardens Edimburgh
16:00 - 17: 30	**Session 10:** Horizon Biodiversity Meets Data	Chair: Wojciech Mróz, Eurosite • **Feedback from Day 1 Session 2 on stakeholder engagement** - *Tami Wooldrige, Royal Botanical Gardens of Edinburgh* • **Plug-and-play Demonstration** - Niels Raes, Laurens Hogeweg, Naturalis Biodiversity Centre

Thank you!

Niels Raes
BMD coordinator

Contact: niels.raes@naturalis.nl

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