LifeWatch ERIC: mission, recent developments and what is offered for climate change impacts on biodiversity and ecosystems research

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Virtual dialog meeting |
INTAROS project (H2020) | February 16, 2021 (09:00 – 12:00)

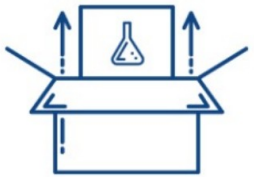

_Research Infrastructures

_What are Research Infrastructures?

Research infrastructures are organisations that **enable** the **research community** to **use** specific **facilities, resources** and **services** in order **to accelerate scientific achievements** and **promote sustainable research**.

_Research Infrastructures

MAKE SCIENCE HAPPEN
& DELIVER BIG RESULTS



SHARE KNOWLEDGE & RESOURCES

PROVIDE OPPORTUNITIES &
PROMOTE INNOVATION

PROMOTE SUSTAINABILITY

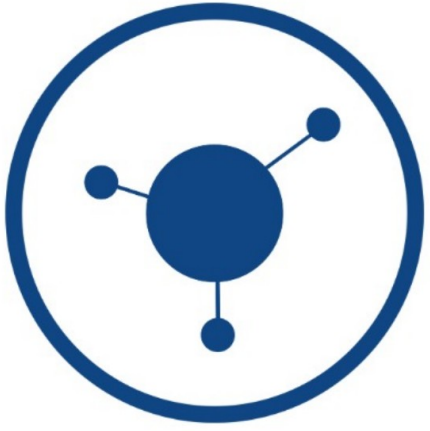
TACKLE SOCIETAL CHALLENGES

FOSTER COLLABORATION

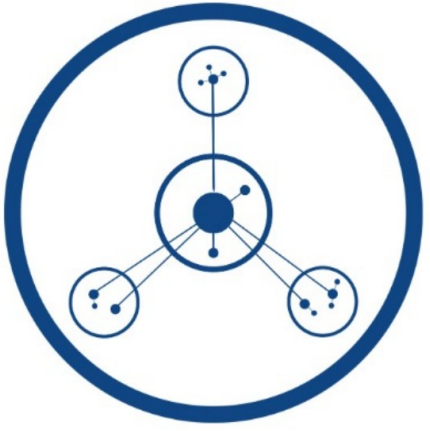
BREAK BARRIERS

_ Types of Research Infrastructures

Different types of Research Infrastructures:



SINGLE SITED RESEARCH INFRASTRUCTURES

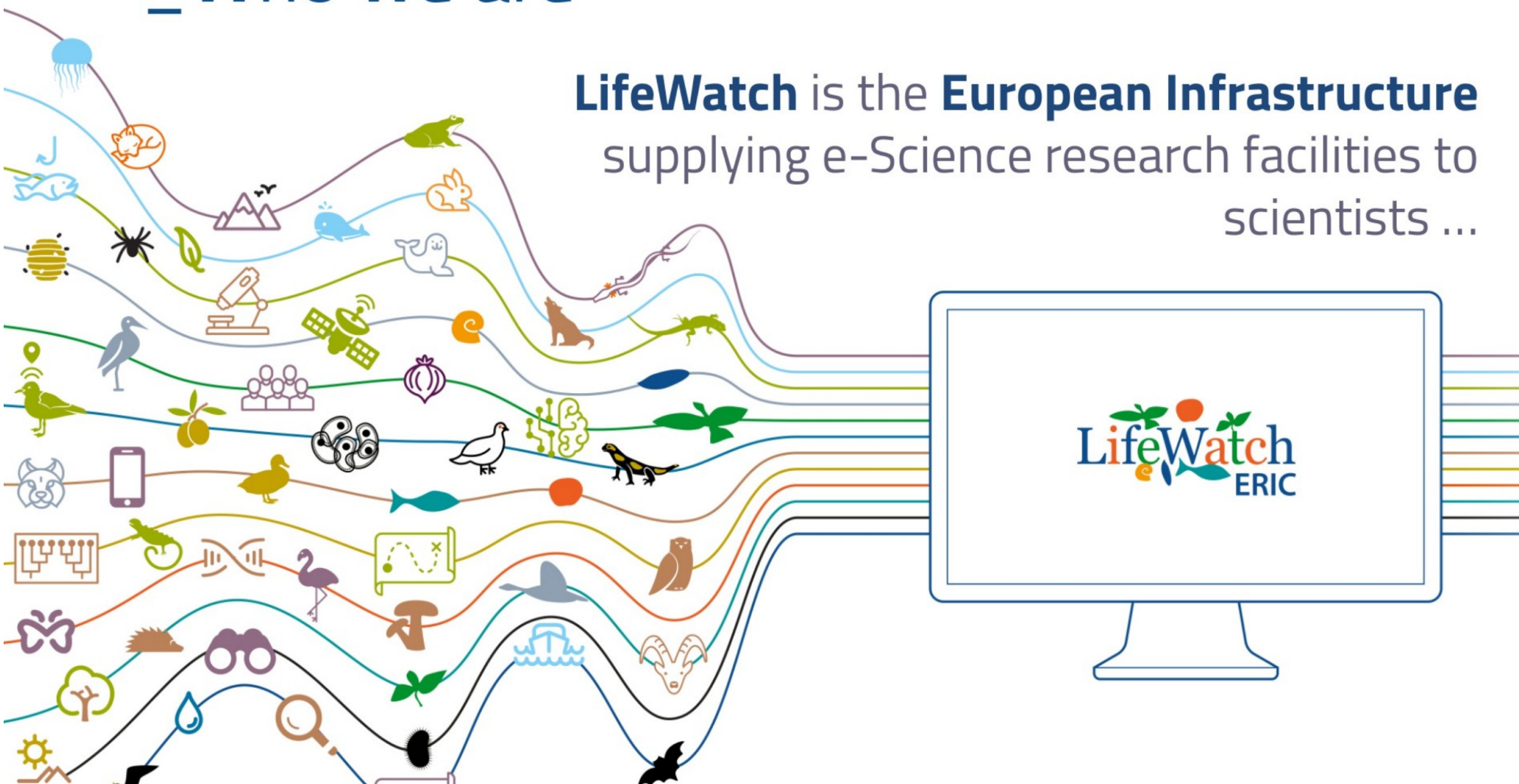


DISTRIBUTED RESEARCH INFRASTRUCTURES

E-SCIENCE RESEARCH INFRASTRUCTURES

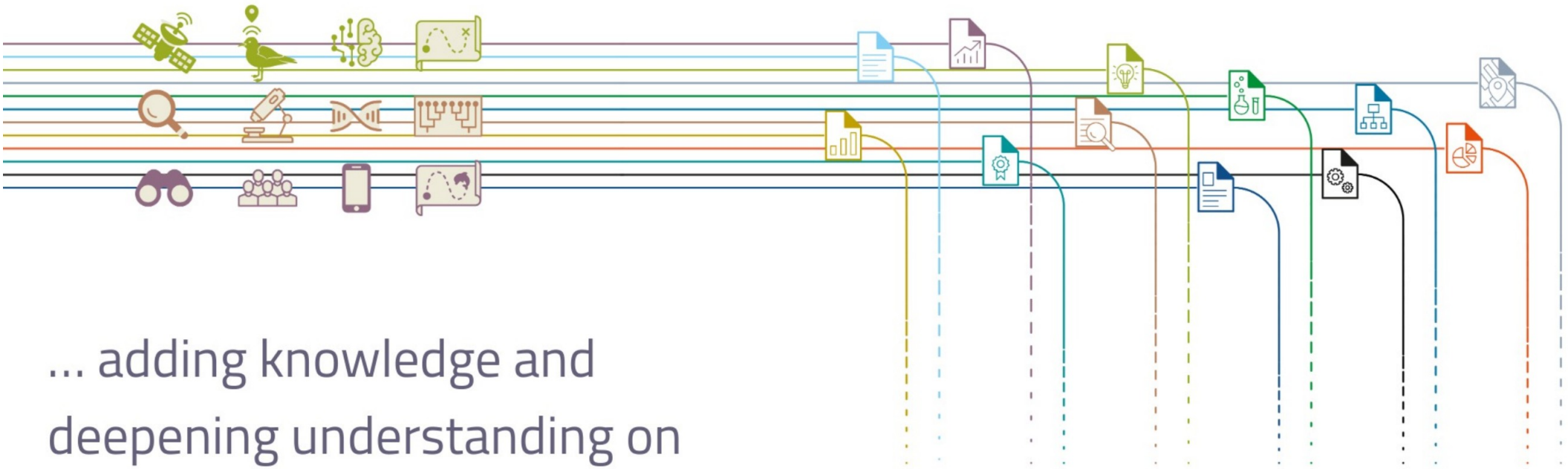
_ LifeWatch ERIC in a nutshell

_Who we are



LifeWatch is the **European Infrastructure** supplying e-Science research facilities to scientists ...

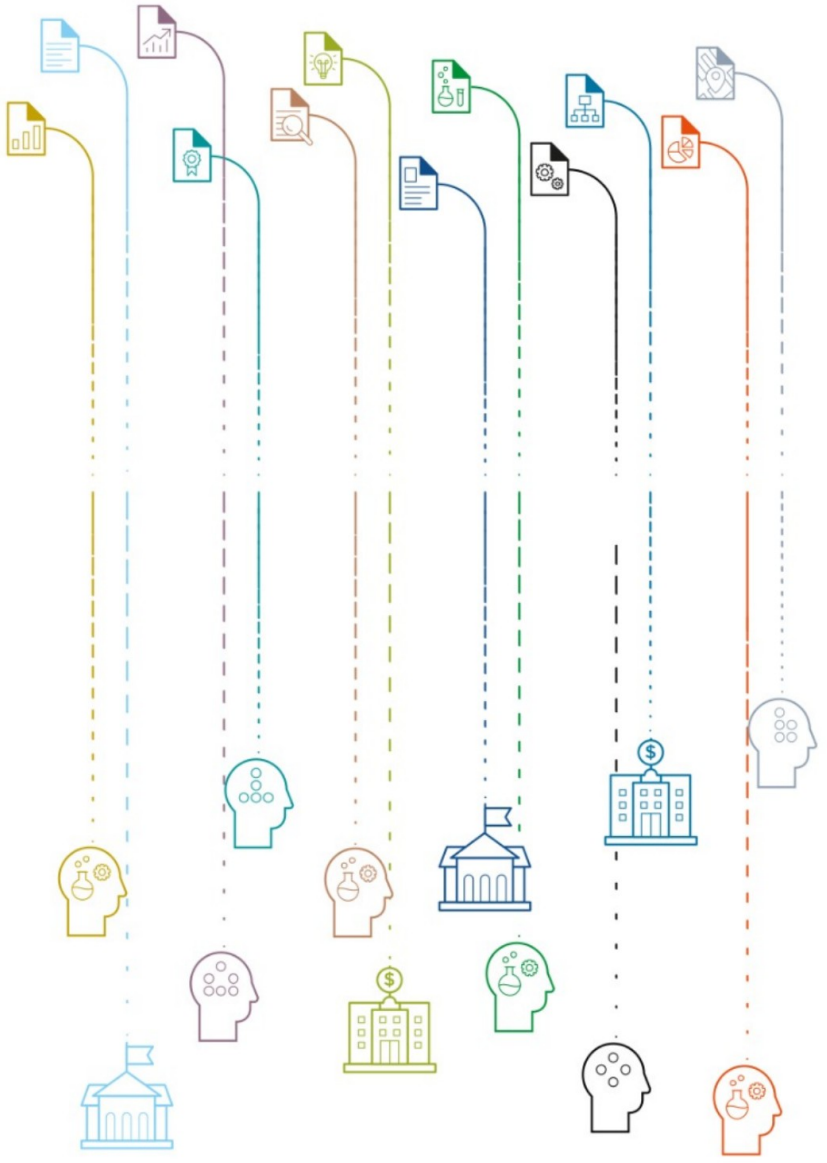
_Who we are



… adding knowledge and deepening understanding on **Biodiversity** organisation and **Ecosystem** functions and services …

_Who we are

... in **support** of our **societies** to address the **key planetary challenges**.



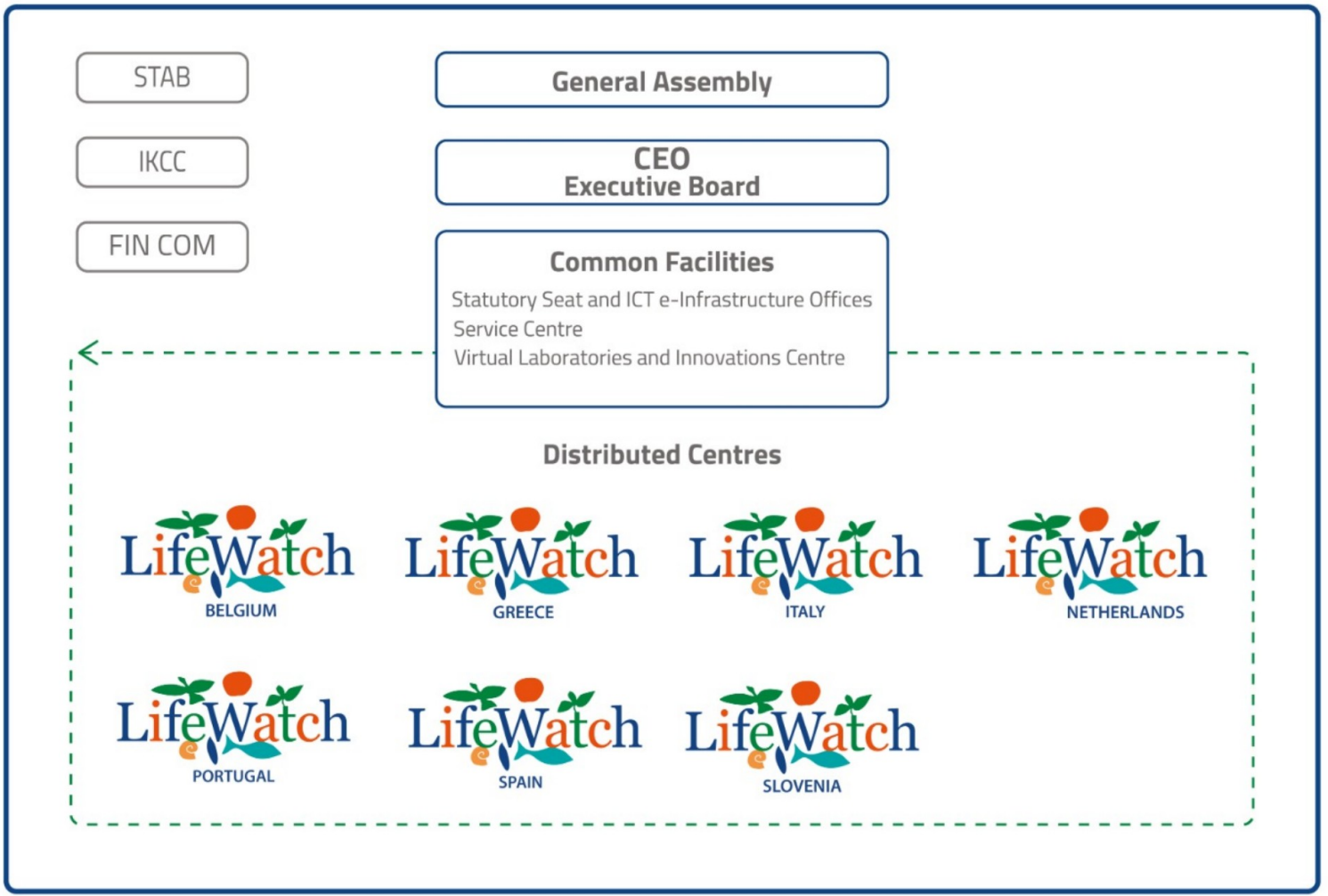
_Mission

LifeWatch ERIC's mission is to be a worldwide provider of content and services for the Biodiversity research community by:

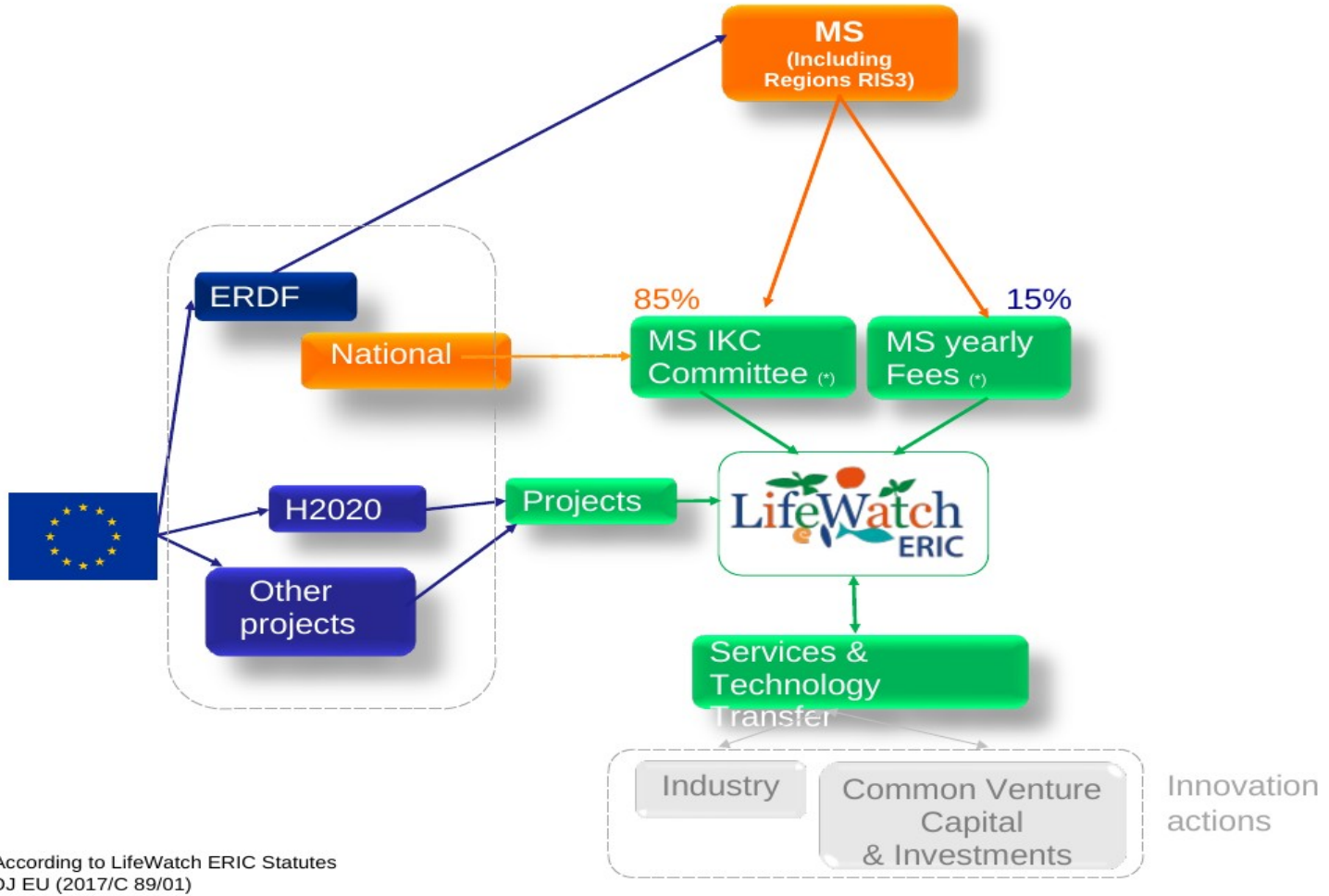
_Mission

- Offering new opportunities for large-scale scientific development;
- Enabling accelerated data capture with innovative technologies;
- Supporting knowledge-based decision-making for biodiversity and ecosystem management;
- Providing training, dissemination and awareness programmes.

_How we work | Governance

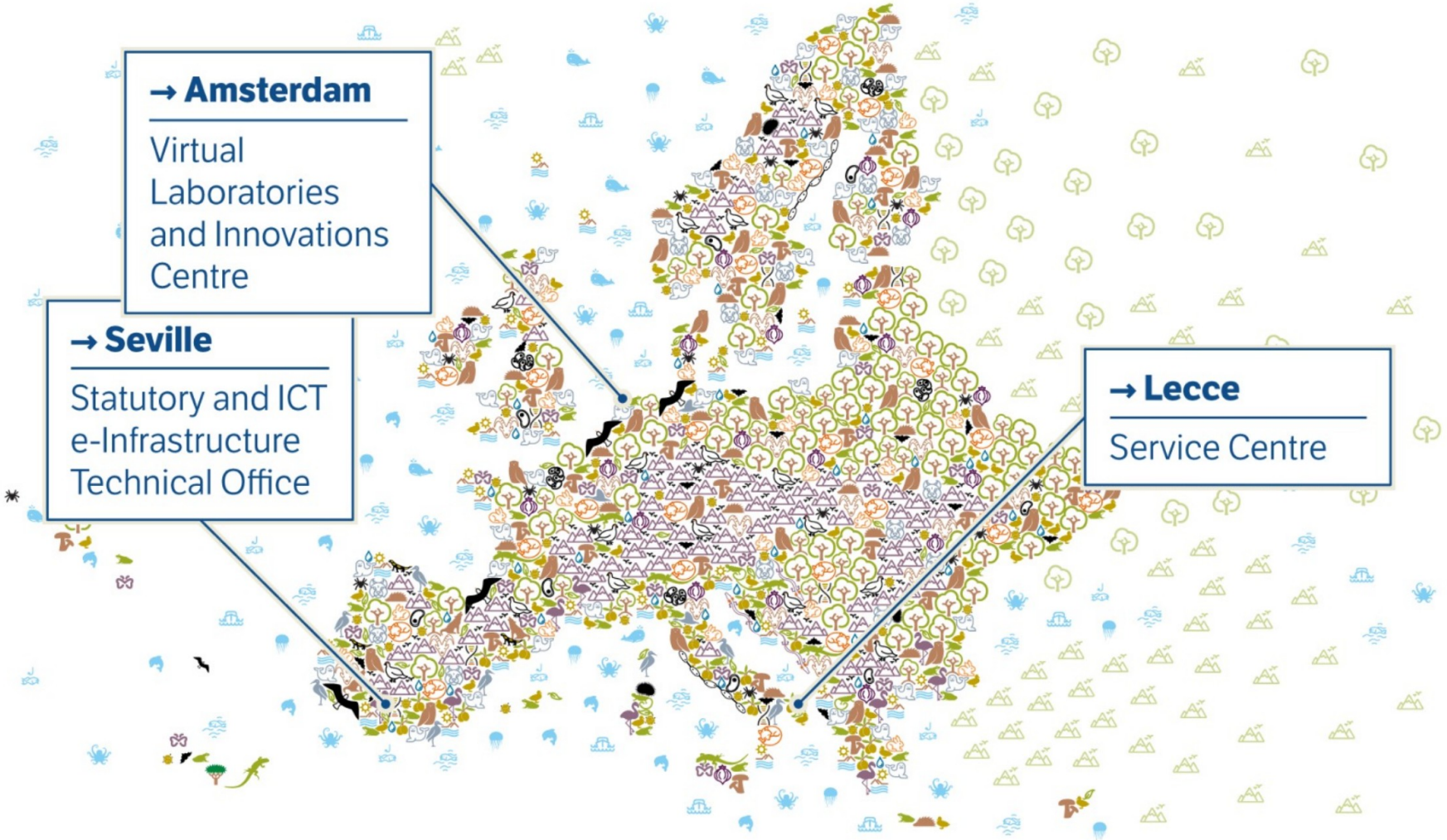


_How we work | Funding scheme

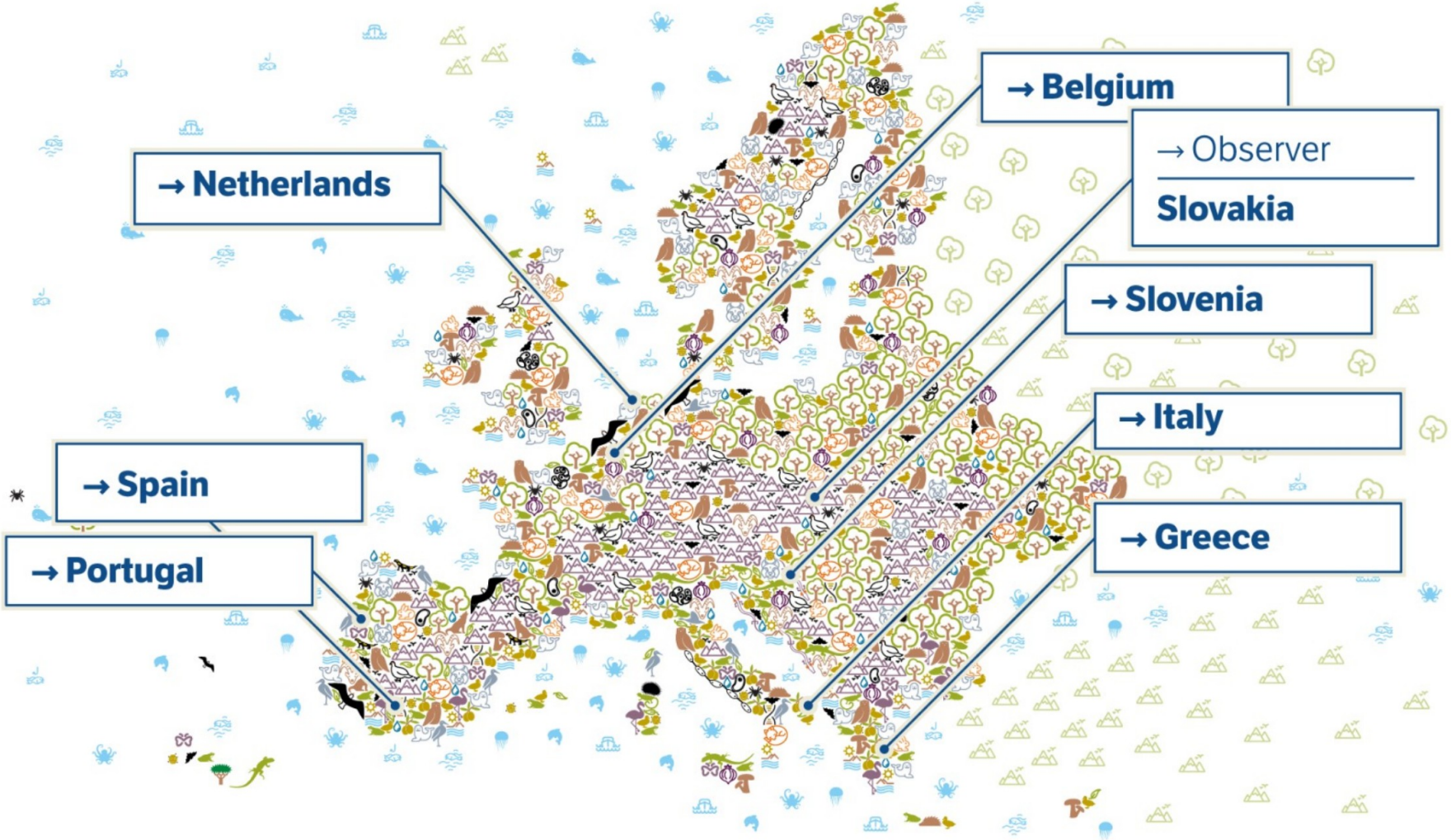


*According to LifeWatch ERIC Statutes
OJ EU (2017/C 89/01)

_How we work | Common Facilities



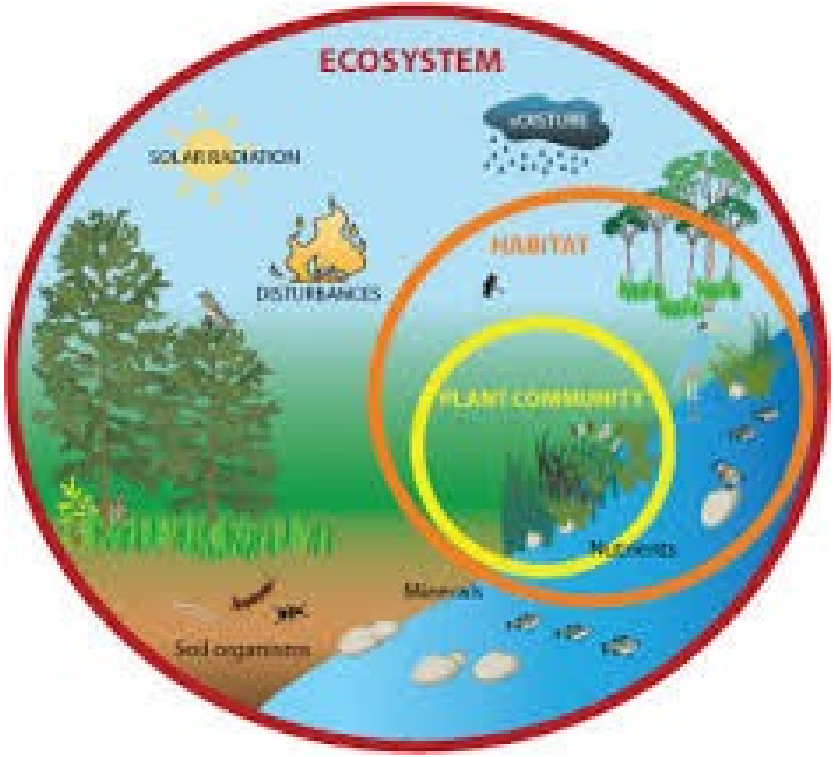
_How we work | National Nodes



LifeWatch ERIC in a nutshell:

https://www.youtube.com/watch?v=m4n-cAcgpl0&feature=youtu.be

Aren’t they complex enough?



The common theory by E.O. Wilson

Consilience: The unity of knowledge. "*Literally a '**jumping together**' of knowledge by the linking of facts and fact-based theory across disciplines to create a common groundwork of explanation*."

Synthetic biology: Looking for knowledge stemming out of evidence from as many disciplines in biology as possible to understand and explain the complex systems in order to sustainably use the resources of our planet.

LifeWatch ERIC: Challenges - Scientific

Modelling Biodiversity on Earth:

- Mapping of diversity, biomass, productivity and socio-economics (including Ecosystem Services)
- Patterns, processes and consequences from change
- Prognosis under certain scenarios

LifeWatch ERIC: Challenges - Infrastructure

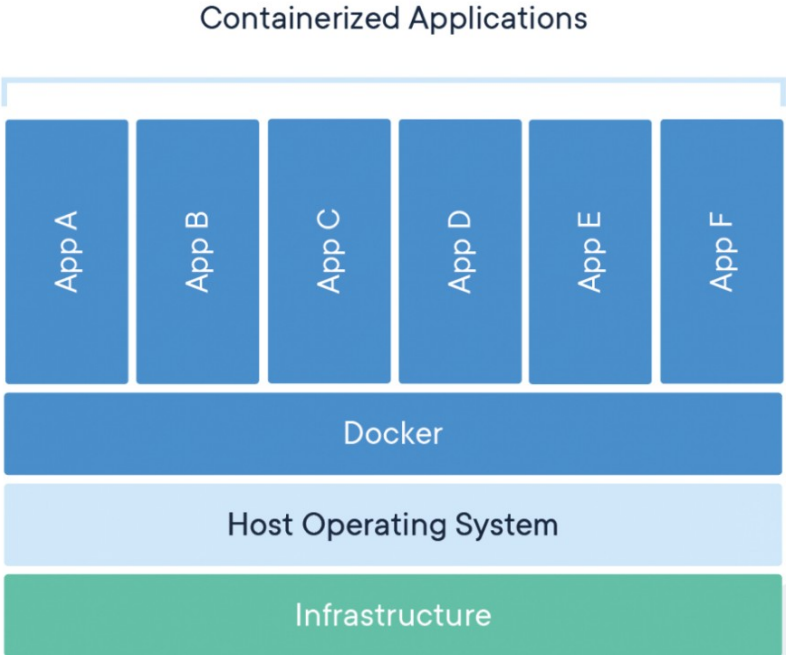
VRE: Virtual Research Environment

- e-Services (electronic services)

- vLabs (virtual laboratories)

- Computational capacity and storage unlimited space

LifeWatch ERIC: Challenges - Infrastructure



VRE: Virtual Research Environment

- “Incubation chambers” for tech developed in Projects
- Transparency in scientific research practice

_Cultural challenge

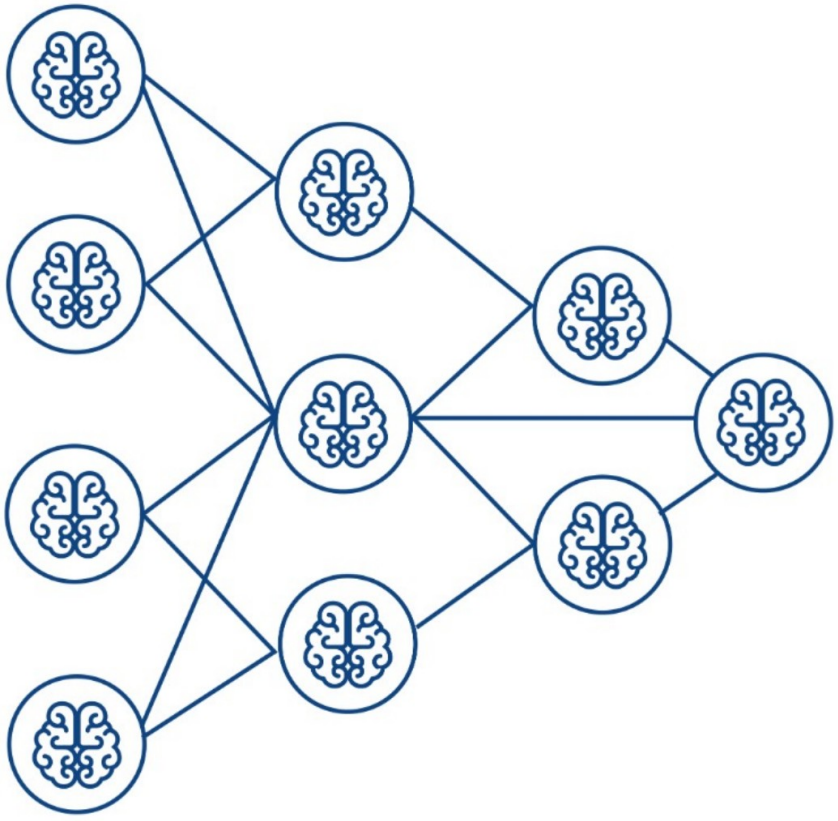
"Shift scientists' attitude from working in isolation, on single-core PCs, into using and benefiting from an ecosystem of web services available on www.lifewatch.eu ..."

_Cultural challenge

"… with the capability to scale up researchers' interests and work on global hypotheses, ensuring transparency, repeatability and attribution for their endeavor."

_Cultural challenge

"This change would direct most of the scientific effort from a single-core (SCBs) operation, or **brain-etics**

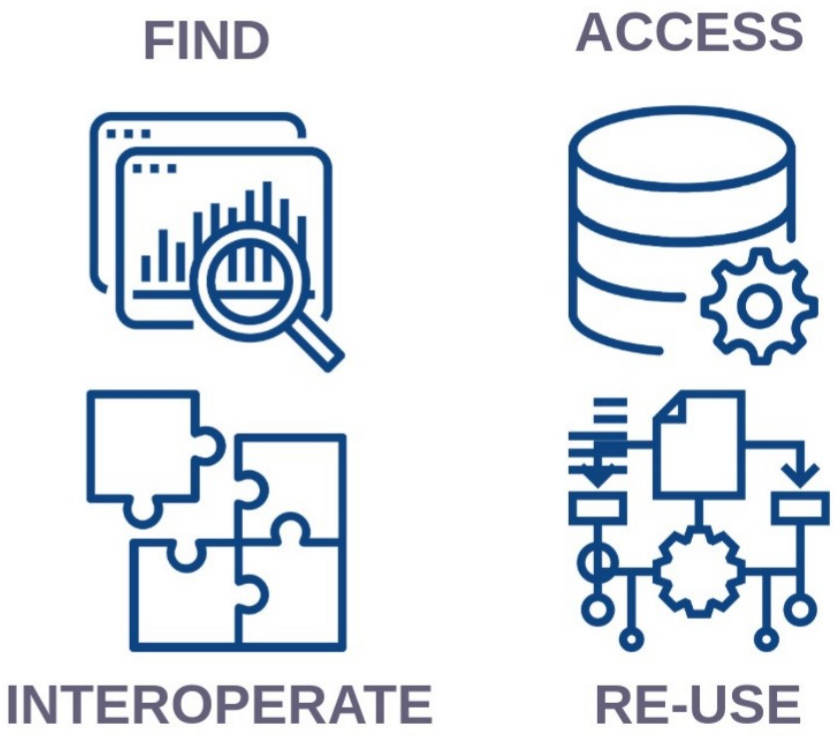


to high performance brain network synthesis (HPBNs) or **brain-omics**"

_LifeWatch ERIC Resources, VREs & Web Services

_What we offer | FAIR DATA

- Find the data and metadata you are looking for, thanks to our **Catalogue of resources**;
- Freely access, use and share large datasets of different types and sources;
- Work with interoperable data, thanks to our standards, thesauri and ontologies;
- Reuse and combine data for different research questions, generating new services and meeting community standards.



_What we provide | VREs

Virtual Research Environments, Open science e-Labs to run experiments, backed up with Decision Making Tools to support smart ecosystem management

_What we provide | VREs

Belgian LifeWatch e-Lab

VREs & e-Labs:

An Integrating Fresh Water VRE for LifeWatch
(ongoing work)

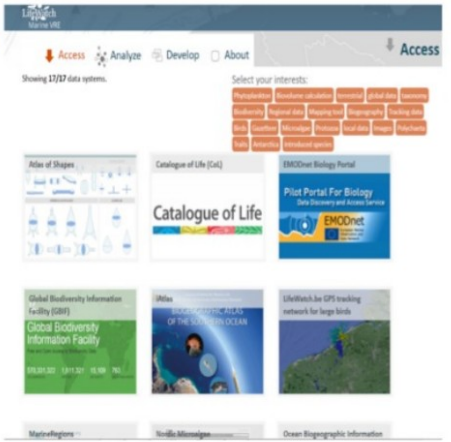
Showcasing tools and services from Research Infrastructures at EGI CF 2015 in Bari

Jesus MARCO DE LUCAS , Fernando AGUILAR , Daniel GARCÍA, Guadalupe CAÑAS (IFCA)
Agustin MONTEOLIVA, Tamara SANTIAGO , Jose Augusto MONTEOLIVA (ECOHYDROS SL)
Ana Yaiza RODRIGUEZ (AEONIUM)
Juan Miguel GONZALEZ ARANDA (MINECO)
AJ SAENZ (CITIC-CENTA)
JRU LW ES

VRE MARINE

-joint effort VLIZ, HCMR, IFCA (CSIC)
-collects 17 data sources
-enables Analysis workflows
-using Fedcloud resources at IFCA*
-in use at:
-Researchers training
-Marine Quality in EU
-ongoing: non-marine

**EGI-Engage funding partially supported, until 28th Feb 2017, this effort, as part of LifeWatch EGI-Engage CC on Data Flow and Observatories*



Phyto VRE

The LifeWatch e-Infrastructure has realised the Phytoplankton Virtual Research Environment (Phyto VRE), a collaborative working environment supporting researches on phytoplankton assemblages and their relative structure, organization and ecological function.

Phytoplankton plays an important role in aquatic ecosystems because it accounts for most of global primary production and affects the biogeochemical processes, trophic dynamics and biodiversity architecture.

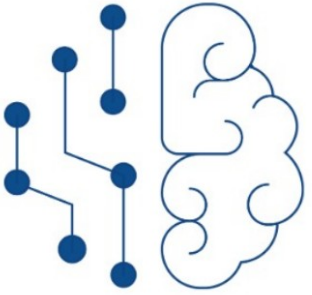
Minisite
Phytoplankton VRE

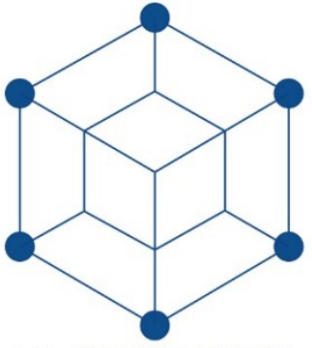
_What we provide | Technology layer

- Making data, services and VRE accessible and usable in a FAIR optics;
- Engaging, tracking, accounting and securing biodiversity and ecosystem resources & services provision, through the LifeWatch ERIC blockchain platform;
- Providing cloud & computational power, and storage capacity to create models for future scenarios;
- Supporting smart ecosystem management in the context of climate change, also thanks to the application of innovative technologies like deep learning and artificial intelligence.

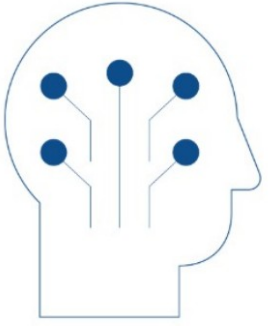
CLOUD & COMPUTATIONAL POWER

ARTIFICIAL INTELLIGENCE





BLOCKCHAIN



DEEP LEARNING

_What we provide | Training & citizen science

Empower citizens to engage with science and contribute to their own well-being:

- Training opportunities on our services and key scientific issues;
- Master and PhD programmes;
- Summer schools;
- Webinars ;
- Educational initiatives.

LifeWatch ERIC_ Co-construction

_ Internal Joint Initiative | Non Indigenous Invasive Species

- Boost the integration of tools & services into the LifeWatch ERIC web portal;
- Focus on a major scientific issue in biodiversity and ecosystem research with relevant socio-economic implications;
- Produce new and synthetic knowledge needed by institutions, administrations and managers to give solutions to major environmental problems at different scales;

LifeWatch ERIC needs to boost its construction and to engage users in developing their research activities into the Virtual Research Environments of the e-Science Infrastructures, by clearly demonstrating and documenting the added value these new technologies bring to address challenging hot topics.

LifeWatch ERIC has started an Internal Joint Initiative with the exact aim of addressing these needs and reinforcing the positioning of **LifeWatch ERIC** within the biodiversity and ecosystem scientific community. As a subject for the demonstration case, LifeWatch ERIC has selected non-indigenous and invasive species (NIS).

If you are interested in the IJI and want to join us on the validation cases, just drop us an e-mail service.centre[at]lifewatch.eu.

Validation cases

Nine validation cases have been agreed on by the scientific community representatives focusing on various aspects of NIS invasion, stemming from the desire of the infrastructure to use the most participative interdisciplinary approach to investigate this wide topic.

As an immediate result of this collaboration, scientists and ICT experts jointly outlined a conceptual paper and designed a workflow that will serve as a living timeline along which different e-tools have to be developed to help address relevant issues related to NIS for scientists, managers, decision-makers and society.

1. Combining Modeling and remote sensing techniques to monitor and control the spread of invasive species: the case of *Ailanthus altissima*
2. European ARMS programme: long-term monitoring of hard-bottom communities for invasive marine species
3. Risk assessment of NIS introduction and establishment, habitat vulnerability to NIS and estimation of the impact on Biotopes
4. Functional biogeography of invasive species: the case of two widely-distributed omnivorous crustaceans
5. Successive invasions in the Mediterranean Sea: How the history of *Caulerpa taxifolia* can inform on the new invaders *Caulerpa racemosa* and *Rugulopteryx okamurae*

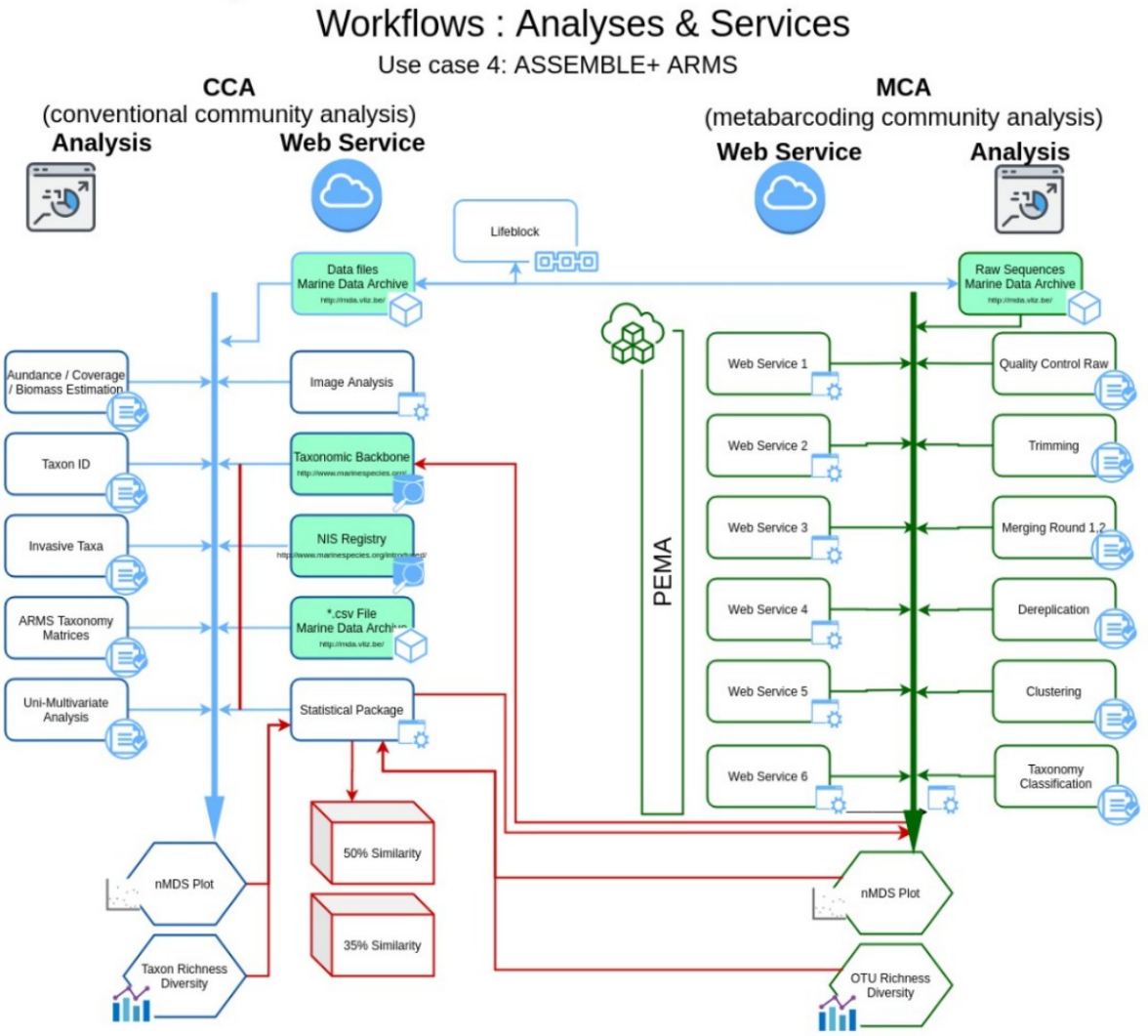
Internal Joint Initiative

- **Rationale & Objectives**
- **Framework & Knowledge Map**
- **Validation Cases**
- **Dahlem Type Workshops**
  - **Rome, 02-06/12/2019**
  - **Seville, 14-18/10/2019**
- **Collaborative Space**

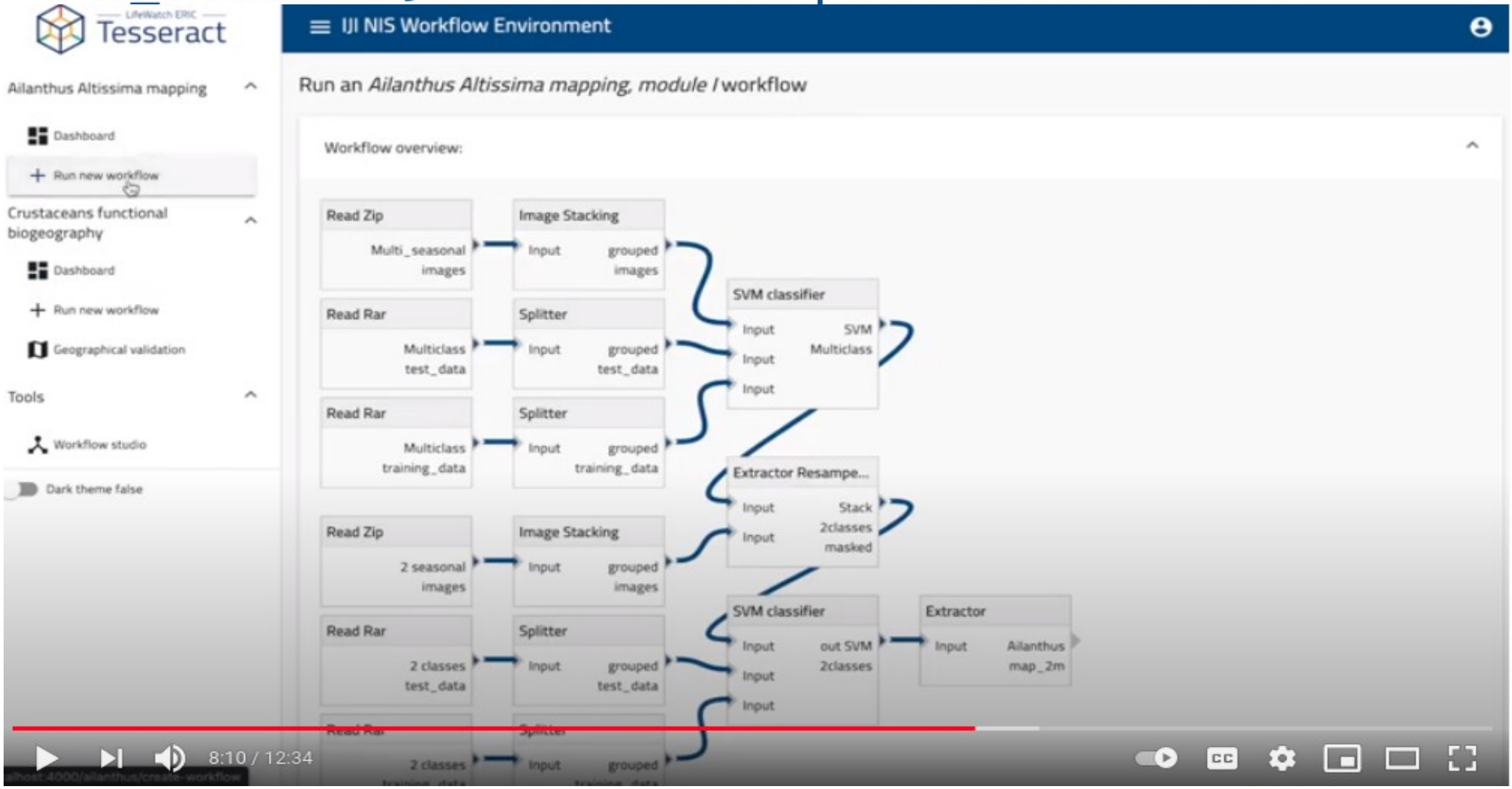
LifeWatch ERIC _ Internal Joint Initiative | Info & Numbers

https://www.youtube.com/watch?v=HtDzIl9dN4k&feature=youtu.be

- 2 Dahlem Type Workshops in 2019 (Seville & Rome);
- 5 Validation cases identified;
- Teams formed;
- Workflows designed;
- 1 scoping paper on its way.



Internal Joint Initiative | Info & Numbers



LifeWatch ERIC: Our next priorities

- **Develop** LW ERIC **common facilities** in a fully **operational** mode;
- Construct and operate the urgently needed **distributed and federated infrastructure** in order to **integrate, organically link** and make all the **web services** developed by the national biodiversity centers available through a single stop-over spot;
- **Bring back** and unite the much **fragmented scientific** and other type of **biodiversity and ecosystem functioning user communities** to their natural home, the LifeWatch ERIC Research Infrastructure;

Thank you for your attention and questions

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Twitter: @LifeWatchERIC