

e-Science European Union Infrastructure for Biodiversity and Ecosystem Research

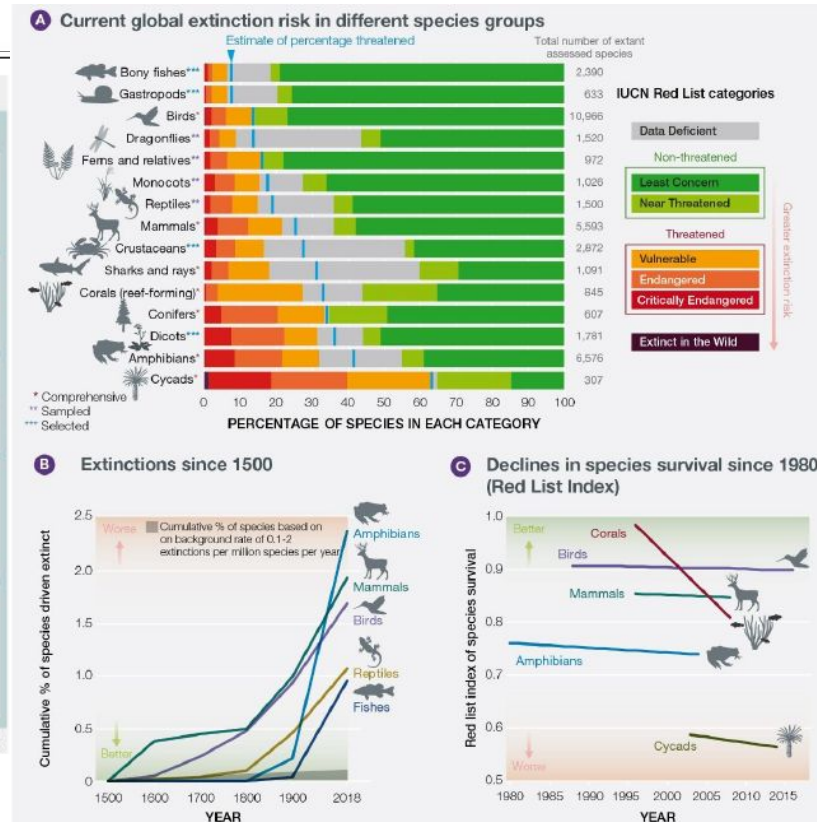
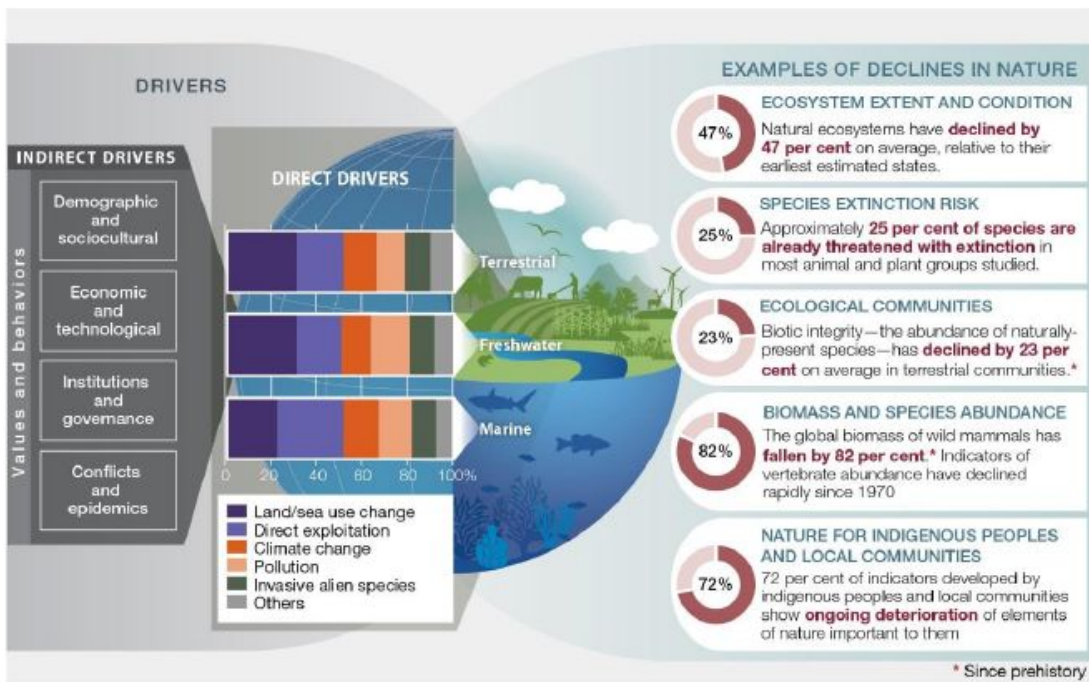
IBERLifeWatch: A scientific, technology and innovation Communities of good practices approach

Juan Miguel González-Aranda, PhD

LifeWatch ERIC Chief Technology Officer

The Big Fact: Towards the Sixth Great Extinction

IPBES/7/10/Add.1





Another well-known fact: The Iberian Peninsula, jointly with their Mediterranean (Balearic, Alborán, etc.) and Atlantic Islands, the so-called Macaronésia (Açores, Madeira, Canarias, Cabo Verde, Selvagens-Salvajes, ...) are also a well recognized **Biodiversity Hot-Spot**



Ecosystems

Species

Time and
evolution

Scale

DNA,
proteins
and genes

© Robert Guralnick & Andrew Hill
(Univ Colorado)

BEF

Climate
change

Habitat
Fragmentation
/loss

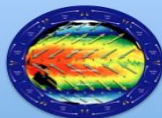
Species
invasions

Compound
impacts

Hot Ecological
Topics
(The Big Five)



oceanic and
atmospheric
processes



Climate system
as driver of
change



Biological
processes,
biodiversity and
ecosystems



Substrate of
lithosphere and
hydrosphere

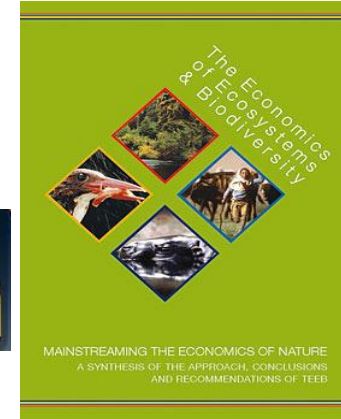
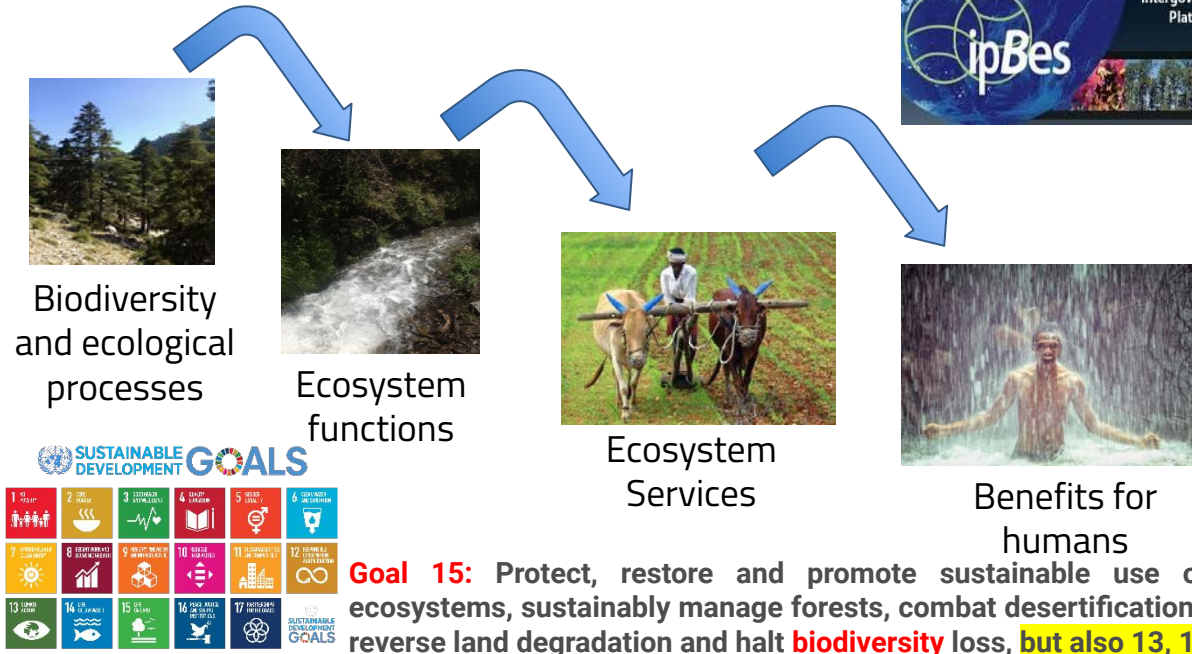
Earth as a single complex and coupled system

Challenges

Essential importance of
addressing the big
environmental
**challenges and support
knowledge-based
strategic solutions to
environmental
preservation, in
particular the
Biodiversity loss !!!**

The ecosystem services cascade: from biodiversity to human well-being

We need to assess and monitor the ecosystem functions, the ecological processes and the biodiversity upon humans well-being depends on.



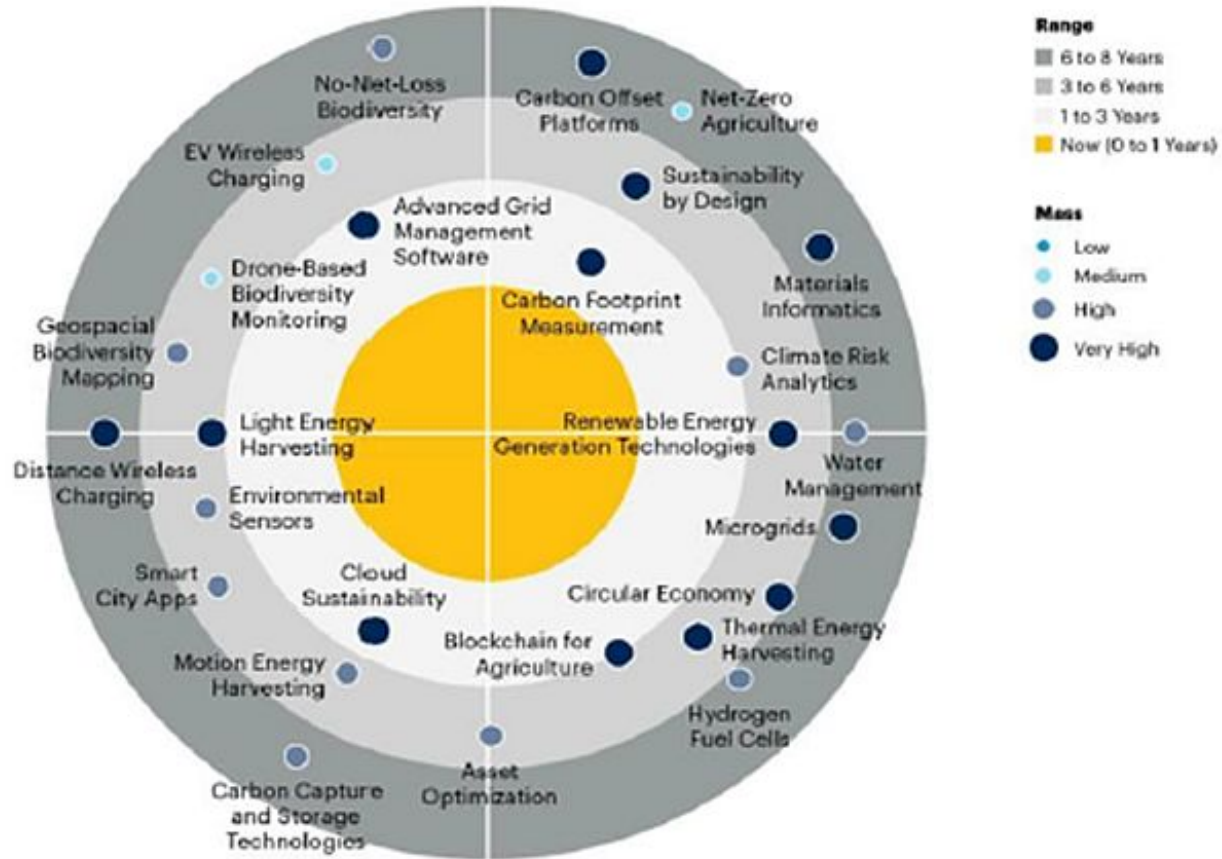
THE ECONOMICS OF ECOSYSTEMS & BIODIVERSITY (TEEB)-2010

We need

TO UNDERSTAND:

- Environment limits/ecosystem "resilience"
- **Relationships among BIODIVERSITY & ESSENTIAL ECOSYSTEM SERVICES**

Impact Radar for Environmental Sustainability





Digitising European Industry (Industry 4.0 -> 5.0 evolution)

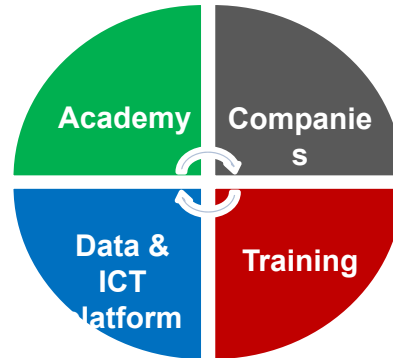
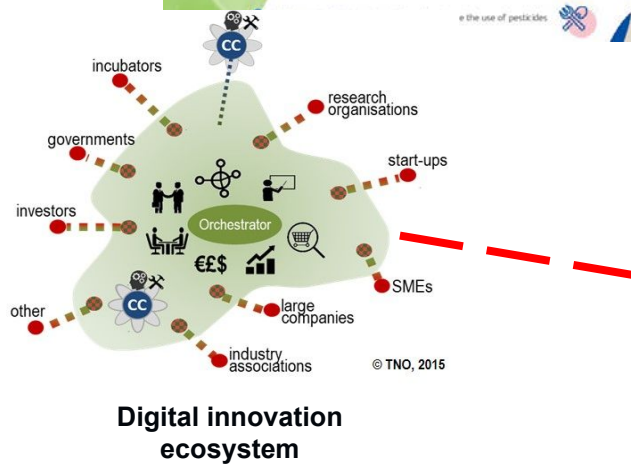
COM(2016) 180 final



DIHs

Regulation Platforms

Skills



■ **Research Infrastructures (RIs)** are at the center of the quadruple helix (Pór, 2005), where research, academy, private companies (**including SMEs**), civil society organizations and public administration meet by applying an incremental and iterative process for **creating new knowledge** (González-Aranda et al., 2009-2022).



Biodiversity

The European
Green Deal

December 2019
#EUGreenDeal

Ecosystems provide food, fresh water, clean air, and shelter. They mitigate natural disasters, pests and diseases and help regulate the climate.

BIODIVERSITY

- The Commission will present a **Biodiversity Strategy by March 2020**.



- The EU will **work towards an ambitious new global framework** to protect biodiversity at the UN Biodiversity Conference in October 2020.



- The Commission will make proposals to **green European cities** and increase biodiversity in urban spaces.



- The **farm to fork strategy** will work to reduce the use of pesticides and fertilisers in agriculture.

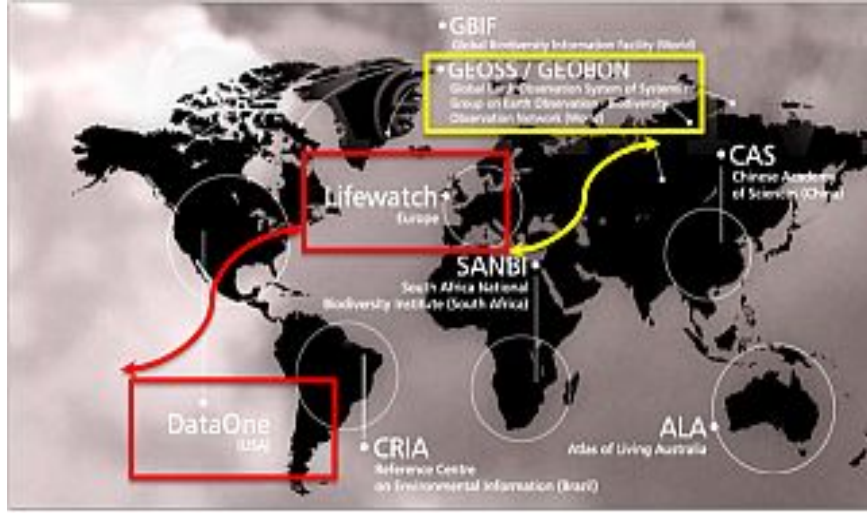


e-Science European Infrastructure for Biodiversity and Ecosystem Research

<https://www.lifewatch.eu>

LifeWatch ERIC is a **European e-Science distributed Infrastructure** focused on how to measure the impact of **Global Climate Change** issues on Earth **Biodiversity and Ecosystem Research**. <https://www.lifewatch.eu>

Expected IMPACT: LifeWatch ERIC as a structuring tool for the **European Research Area**, also supporting **policy decision making** addressing **Societal Challenges** which demand scientific knowledge in a **Global Climate Change** context, including **Citizen Science** activities.



And not only!



GENERAL ASSEMBLY



**H2020-INFRASSUP-
RESINFRA**



UNITED NATIONS
Office for Outer Space Affairs



European Open Science Cloud



Facing e-Biodiversity challenges together: GBIO framework-based synergies between DiSSCo and LifeWatch ERIC

González-Aranda, Juan Miguel¹; Koureas, Dimitris²; Addink, Wouter²; Hirsch, Tim³; Arvanitidis, Christos¹; Sáenz-Albanés, Antonio-José¹; Schalk, Peter².

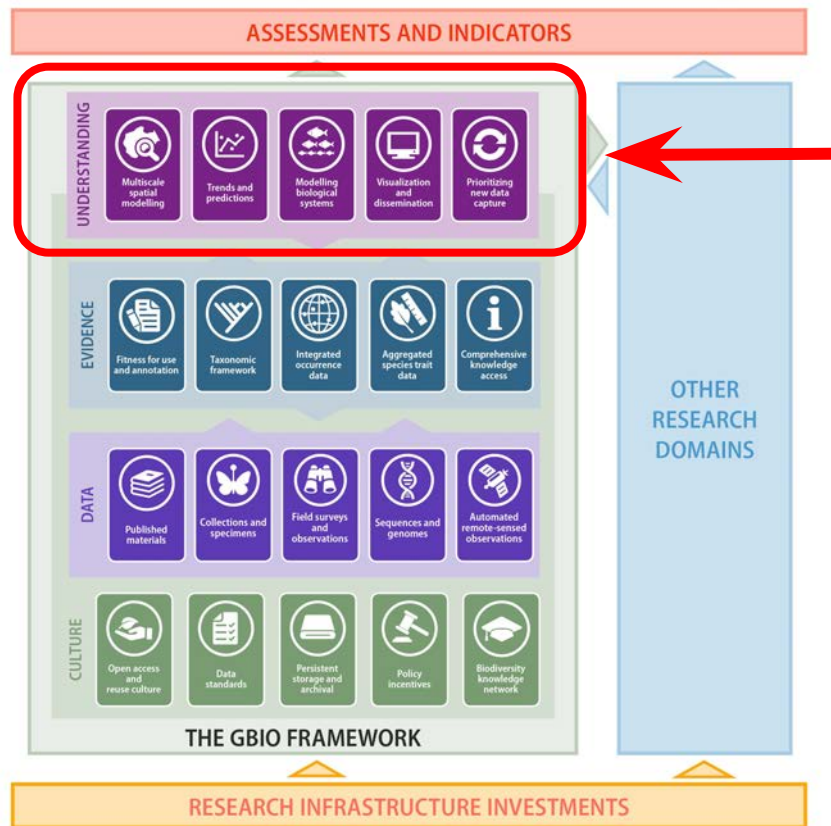
Oral presentation during the session 'SI22-DiSSCo as a model for regional development of collections infrastructure' in the Infrastructure track at the forthcoming joint Biodiversity Next conference in Leiden, The Netherlands, October 20-25, 2019.



A joint conference by



Biodiversity and Climate Change Monitoring: Modelling to generate **KNOWLEDGE**



The Global Biodiversity Informatics Outlook (GBIO) Framework (Hoborn et al. 2012) identifies 20 components as essential elements of biodiversity informatics and organized as four layers: **Culture**, **Data**, **Evidence** and **UNDERSTANDING**: Building modeled representations of biodiversity patterns and properties, based on any possible **EVIDENCE** using five components.



Is the product-framework we are deploying to build large scale virtual research environments focused on building **understanding** for ecosystem research



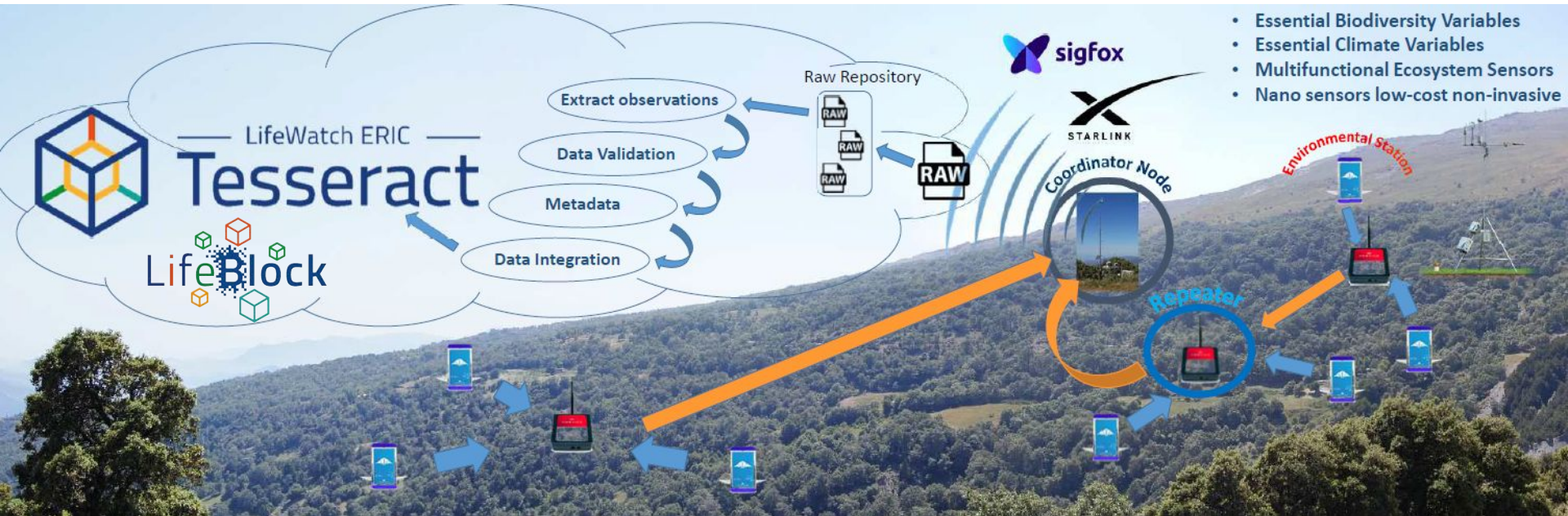
Is the product-framework we are deploying to provide provenance and anti-tempering to our collected data (including the Environmental Observatory Networks). **Guaranteeing persistence of evidences.**

Biodiversity and Climate Change Monitoring and Modeling:

Heterogeneity and Scale Factors Challenges

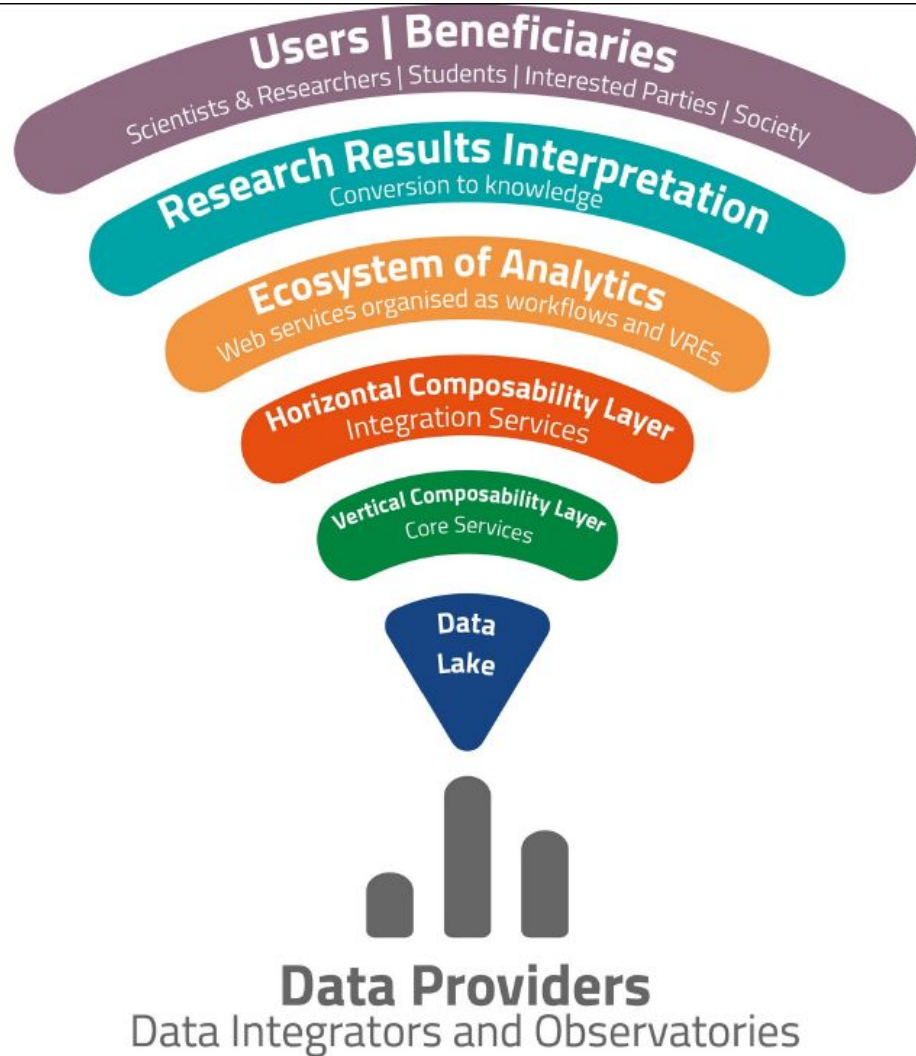
Co-designing and co-developing a global capacity from **Europe (Green Deal, AgroEcology)** plans linked to other worldwide areas, in particular **Latinamerica & Caribbean (EU-LAC)** and **AFRICA (EU-LAC)** by integrating:

- **Low-cost** sensors for collecting and using biotic & abiotic observations for conservation and ecosystem-based sustainable management. Also mapping and monitor natural and protected areas.
- **Promoting Sustainable Agriculture (AgroEcology) & Fisheries** and **Development for Biodiversity**, and supporting associated circular economy ("green" & "blue") mechanisms





LifeWatch ERIC:
What has been
developed in the
first 5y of our
implementation?



_What we offer

After our first 5y implementation period, a prototype of an RI on the Biodiversity and Ecosystem Research: TRL: 5

1. Catalogue of Resources (Ecoportal)
2. FAIR Datasets
3. Standards, thesauri and ontologies
4. Web Services



_What we offer

5. Virtual Research Environments

6. LifeBlock



7. Tesseract: technical composability layer (incl. Jupyter Notebook)

8. Network of communities

9. Access to *next-gen* e-Infrastructures (e.g. EOSC Future)

CLOUD &
COMPUTATIONAL
POWER



ARTIFICIAL
INTELLIGENCE



BLOCKCHAIN



DEEP LEARNING



LifeWatch ERIC
Tesseract

LIFEWATCH SPAIN Community is structured by its Joint Research Unit (acronym **JRU LW.ES**)

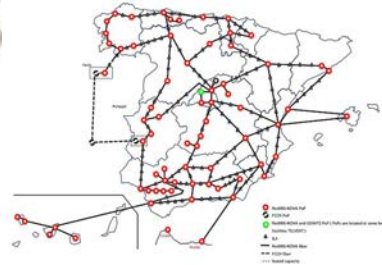
Composed of **33 Organizations & Institutions** (October 2022)

GOVERNANCE SCHEME





Federation of the **Spanish** and **Portuguese** national grid initiatives which provides core services to IBERLIFE initiative and in turn to the EOSC through LifeWatch ERIC.



Guaranteeing **Portuguese** and **Spanish** connectivity, and in turn with the rest of EU and international (Latin America and Caribbean, etc.).



Guaranteeing Supercomputing & HPC in tightly collaboration with **Portuguese** colleagues such as LIP, among others.

RIS³ – RIS⁴ and ESIF related initiatives

- Individual countries commit to participate in ESFRI (including ERIC) following specific strategies, which usually are also based on **regional interests**. There is a clear interest and involvement of **regional authorities** in each country, which demand to be part of this process. Not-surprisingly, **several regions of Eastern & Southern Europe have included the construction or the upgrade of RIs in their Regional Strategies for Smart Specialization (RIS³ – RIS⁴) with the aim to mobilize the Structural Funds allocated to them:**

- ✓ That is the case of the 3 European regions which will focus our case study: Andalusia-ES; CCDR-N Porto Norte-PT; and Regione Puglia-IT



Workshop on the use of Structural Funds for the construction of distributed e-Infrastructures supporting ENVironment initiatives
May 12th, 2014

EU Commission - DG CONNECT

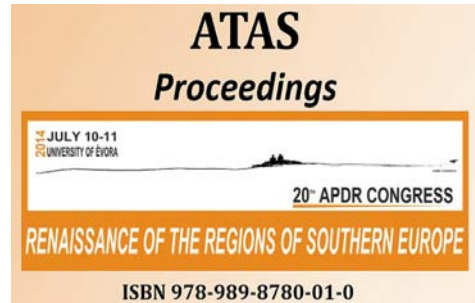
Avenue de Beaulieu 25, (room S1), 1160 Brussels



<http://www.rich2020.eu/symposium2016>

Madrid, April 2016

RICH Symposium on Funding Instruments for developing Research Infrastructures



**Italy, Portugal & Spain regional
cooperation results**

MAKING A JOINT USE OF EU-FUNDS: OPPORTUNITIES AND CHALLENGES ASSOCIATED TO EUROPEAN RESEARCH INFRASTRUCTURES

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Ricardo Migueis², Alberto Basset³, Daniel Escacena Ortega⁴

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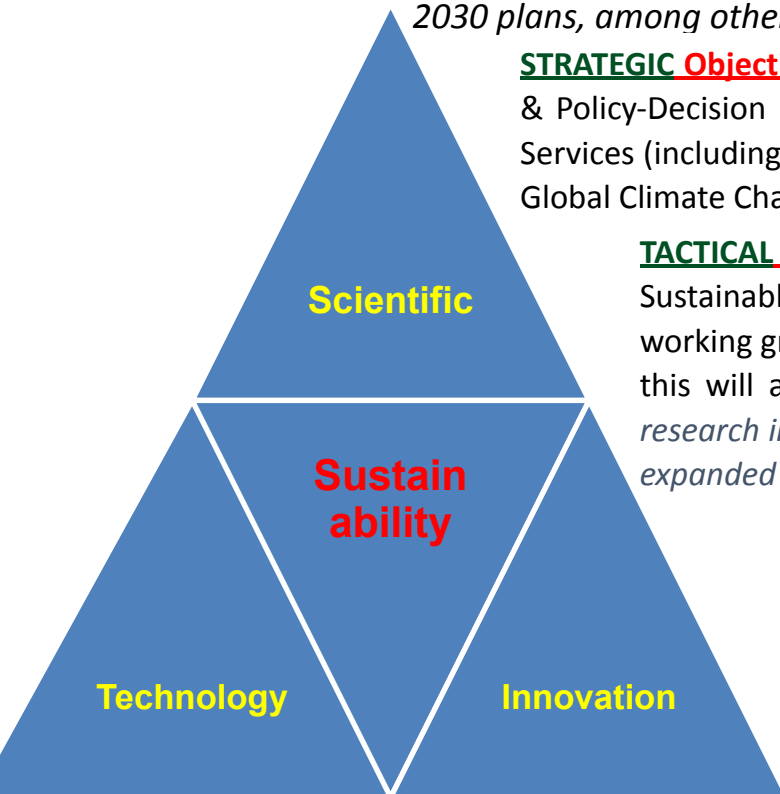
² Fundação para a Ciência e a Tecnologia-Ministry of Education and Science, Av. D. Carlos I 126 1249-074 Lisboa, Portugal, ricardo.migueis@fct.pt

³ University of Salento, Via per Monteroni 73100-Lecce, Italy, alberto.basset@unisalento.it

⁴ Andalusian Knowledge Agency-Regional Government of Andalusia, C/ Max Planck 3 Edificio Iris 1 Isla de la Cartuja 42092-Sevilla, Spain, daniel.escacena@juntadeandalucia.es

This interest was reflected in the attendance to this workshop, over 80 persons from 15 countries and over 20 regions

IBERLifeWatch session blocks & objectives



ES-PT, Iberian distributed e-Biodiversity Infrastructure consolidation, being based on the huge and excellent Iberian Biodiversity and Ecosystem Research & Sustainable Management Communities-of-Practices addressing *micro-, meso- and macro-scale analysis in synergy with 2030 Agenda for Sustainable Development Goals, Green Deal & Blue Growth and EU Biodiversity 2030 plans, among others; since previously stated, the Iberian context is a “real singularity”.*

STRATEGIC Objective #1: Creation of a LifeWatch ERIC Iberian Board-Committee of Researchers & Policy-Decision Makers on Biodiversity and Ecosystem Research & Sustainable Management Services (including socio-economics aspects) for defining “essential” shared strategic actions in a Global Climate Change Scenario, including Technology & Innovation sectors as well.

TACTICAL Objective #2: Reinforcement of Iberian Biodiversity & Ecosystem Research & Sustainable Management Communities-of-Practice by establishing a coordination working group between their **LifeWatch ERIC National Nodes, both LW.PT and LW.ES**, as this will allow *existing world-class examples in the Iberian areas on how to provide research infrastructure services for biodiversity and environmental studies to be properly expanded (and opened-up) based on the identification of their good work (practices).*

OPERATIONAL Objective #3: Creation of a **Shared Knowledge Hub**, virtual but also initially physically composed by R+D+I centres, e.g., at EuroAAA leven in **Mértola, Matalascañas-Doñana and the CIBEAS ???** to guarantee the interoperability of previously identified initiatives’ developments from/to the **European Open Science Cloud (EOSC)** and **Copernicus** (among other EU, including EU-LAC and EU-Africa initiatives) through LifeWatch ERIC distributed e-Infrastructure.

; Muito obrigado, muchas gracias ! Thank you very much for your attention !



<https://www.lifewatch.eu>

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GENERAL ASSEMBLY



SUSTAINABLE DEVELOPMENT GOALS



Science Summit at UNGA77
13-30 September 2022

