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delle Ricerche

WP6 Terrestrial Biosphere

ITINERIS Italian Integrated Environmental Research Infrastructures System



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WP6: Terrestrial Biosphere

The seven RIs involved in the WP are all developed in the ESFRI context and for this reason with a strong international characterization and established links with extra-EU similar initiatives.



Develops new bioprocesses for sustainable use and valorization of natural resources, through the discovery, production, and engineering of novel enzymes and omic approaches with expression platforms and bioreactor technologies.

www.ibisba.eu



Create a unique European collection that digitally unifies all European natural science assets under common access, curation, policies and practices involving EU natural history museums and institutions holding scientific collections.

www.dissco.eu



Enable researchers to use facilities, resources and services for plant phenotyping across Europe to help to better understand plant performance and translate this knowledge into application.

emphasis.plant-phenotyping.eu



Understanding the complex long-term interactions between people and nature. The mission of eLTER is to facilitate high impact research on impacts of climate change, biodiversity loss, soil degradation, pollution, and unsustainable resource use.

www.lter-europe.net

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Studies global change drivers on ecosystems, using platforms to simulate environmental impacts on plant ecosystems, or analyzing plant ecosystem responses via remote/proximal sensing and modelling.

www.anaee.eu



Providing e-Science research facilities to scientists working on biodiversity and ecosystem structure and functions, and the services they offer to mankind, in order to support society in addressing key planetary challenges.

www.lifewatch.eu



In the ICOS Ecosystem component the green-house gases exchanges between ecosystems and atmosphere and monitored continuously and distributed in near real time together with meteorological and ecosystem state variables

www.icos-ri.eu

WP6: Participants in the WP

- CNR-IBBA-Milano
- CNR-IBE-Firenze
- CNR-IGG-Pisa
- CNR-IRSA-Taranto
- CNR-IBBR-Bari
- CNR-IBBR-Napoli
- CNR-IRET-Firenze
- CNR-IRET-Lecce
- CNR-IRET-Roma
- CNR-IPSP-Firenze
- CNR-IPSP-Napoli
- CNR-ISMAR-Venezia
- UNIFI-DAGRI-Firenze
- UNIFI-SMA-Firenze
- INFN-Bari



WP6: Summary of the activities

The WP activities are all designed to build a **coordination structure and domain hub** with the aim to support and assist RI in their development and management that must ensure **full interoperability**, promoting **inter-RI data use** and whenever possible **co-location** and **standardization** of methods and tools.

It will organize the Italian contribution to the **Essential Climate Variables (ECV)** and **Essential Biodiversity Variables (EBV)** provision and to the **Satellite derived products validation**, identifying the current gaps and designing and implementing the best strategy to fill them.

The activities will be organized around five main Objectives

WP6: Objective 1 - Integration and harmonization of Terrestrial RIs

Fill gaps in the key observations needed to ensure the provision of a complete and exhaustive view of the observed process/ecosystem/quantity.

How:

- ✓ Upgrade the RIs by installing **new instrumentations responding to the digital requirements**
- ✓ Ensure a **robust and continuous data collection and flow** toward the ITINERIS Hub
- ✓ Implementation of **new processing pipelines and services**
- ✓ Implementation of the **ITINERIS Terrestrial Ecosystem Data Store**



WP6: Objective 2 - Nature Based Solutions

Build a service to support RIs data use for pollution control using Nature Based solutions from planning to verification, designed also for private sector.

How:

- ✓ Specific **instruments** installation for **NOx and O3 monitoring**
- ✓ System of **drones** to monitor and verify the effectiveness of the actions
- ✓ **VRE** for the services deployment



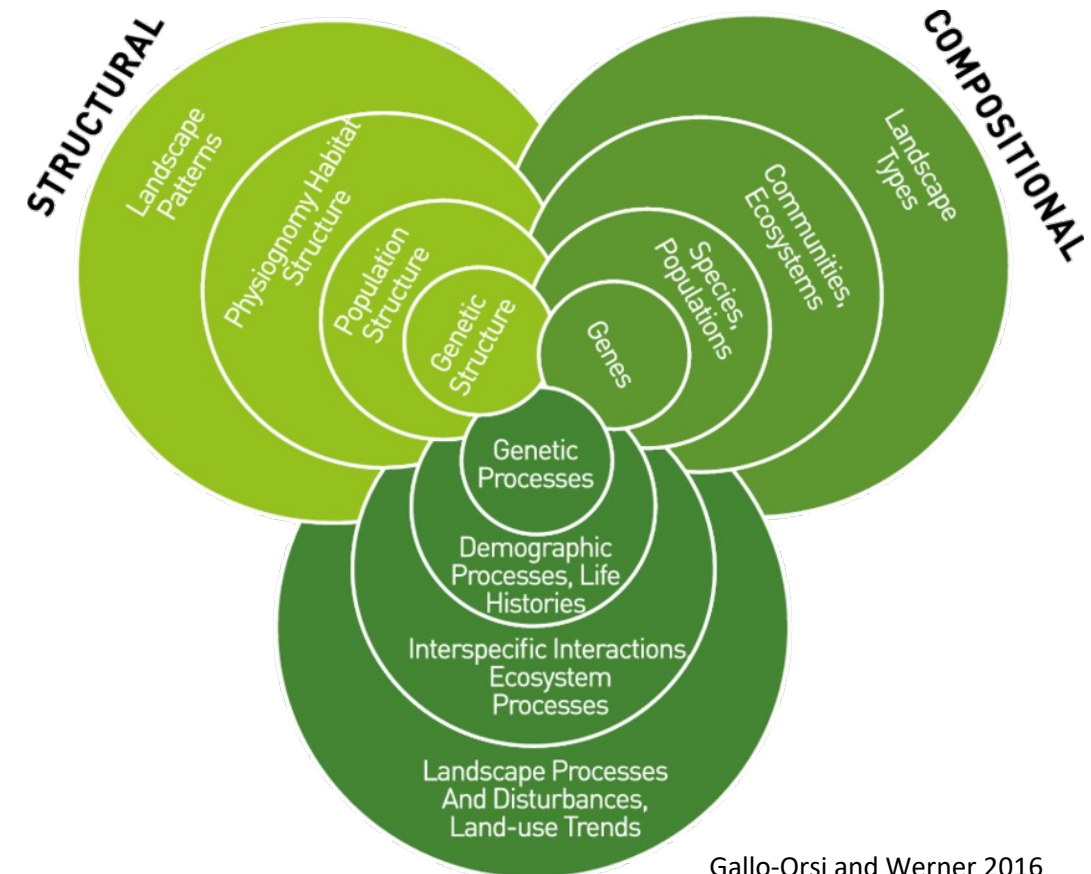
<https://landuse.co.uk/>

WP6: Objective 3 - Functional Biodiversity responses to changes

Build a service to support RIs data use in the context of ecological responses to global warming and their implications on functional biodiversity organization and conservation.

How:

- ✓ Upgrade of the **facilities for metabolic studies**
- ✓ Upgrade of the **facilities for space use behavior and tropho-energetics**



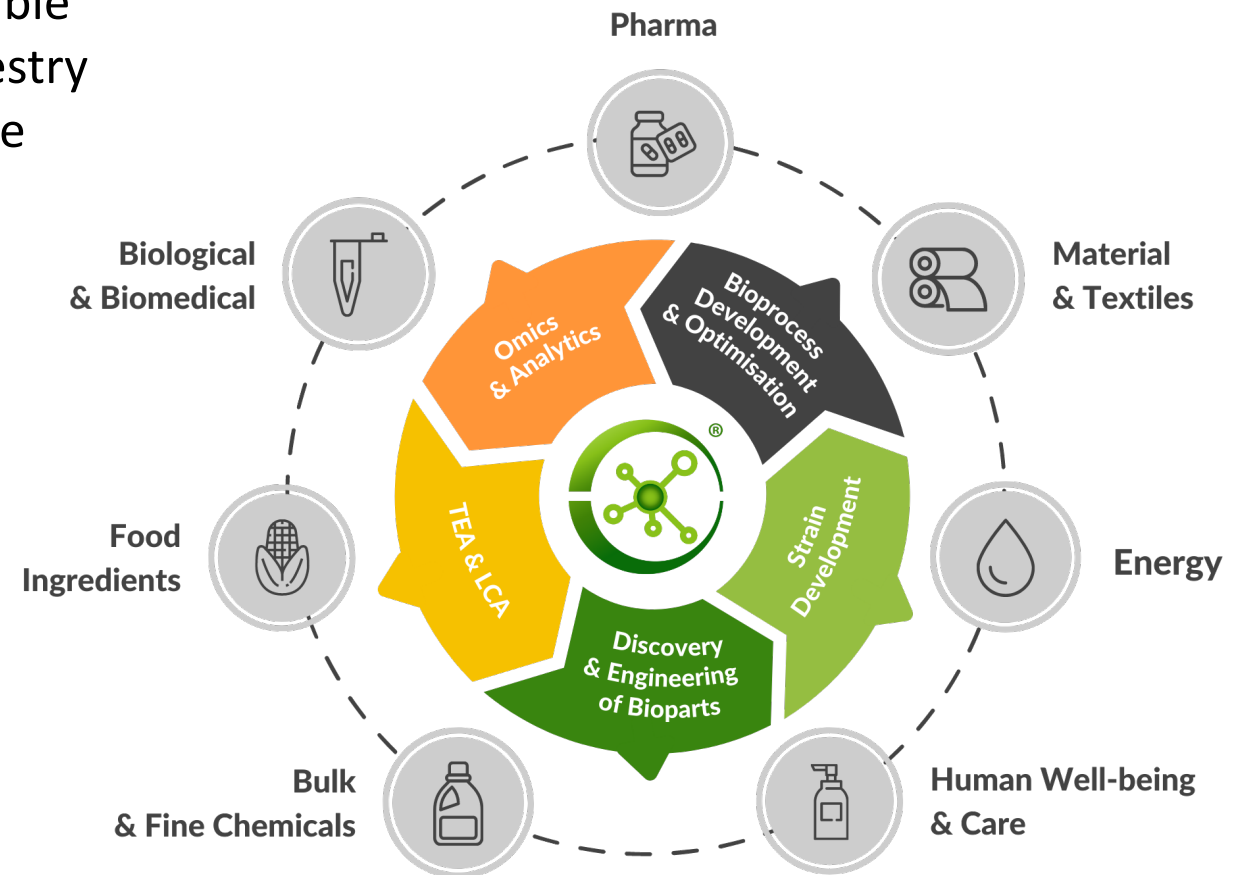
Gallo-Orsi and Werner 2016

WP6: Objective 4 - Sustainable Agriculture & environmental biotechnology

Develop services and technological tools for the sustainable use, valorization and optimization of agriculture and forestry resources for low impact bio-based processes, to mitigate climate change and foster circular economy

How:

- ✓ Upgrade the facilities for omic studies and data acquisition on enzyme features to set up new bioprocess
- ✓ Upgrade the facilities to implement **expression platforms** and **bioreactor technologies**



WP6: Objective 5 - Remote Sensing products validation network

Develop services and technological tools for the sustainable use, valorization and optimization of agriculture and forestry resources for low impact bio-based processes, to mitigate climate change and foster circular economy

How:

- ✓ Set of **ground radiation sensors** to be installed in the different RIs
- ✓ **UAV** system equipped with **hyperspectral cameras** system for area mapping



WP6: Most relevant expected outcomes

- An improvement and a new organization of the Terrestrial Biosphere RIs through a coordination hub connected to the ITINERIS HUB
- Improvement in the RIs measurements and services for an integrated data use, also in relation to the WP8 activities (cross-domain)
- Development of four example services:
 - Service for Natural Based Solutions
 - Service for Biodiversity responses to changes
 - Service for Sustainable agriculture and environmental biotechnology
 - Service for Remote Sensing products validation

WP6: Inter-relation with other WPs

In addition to the common link to the ITINERIS HUB and participation to the **WP8** where the different components jointly develop new cross-domain services, the Terrestrial Biosphere WP is connected to:

- **WP2** for the FAIR principles development and application to the data collected
- **WP3** for the common training system needed to ensure continuous formation to the current RIs personnel and the training of next generation RI managers.
- **WP4** and **WP5** for the continuous spatial exchange between the terrestrial ecosystems and atmosphere and marine domains.

WP6: a large users family

