Climate Change as a Main Driver for Evolution of GEOSS

Alessandro Scremin

27/05/2022

Climate Change as a Main Driver for Evolution of GEOSS: GEOSS Platform Plus

An ESA-led project kicked-off 1/1/22 with a duration of 3 years
receiving funding from the European Union's Horizon 2020
Research and innovation programme under grant agreement No 101039118
with contributions from the Italian National Research Council, University of Geneva and Eversis.

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Institute of Atmospheric Pollution Research
National Research Council of Italy

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Setting the Scene …

Voice from Sir David Attenborough speech, COP26 Summit, November 1, 2021
Video by ESA

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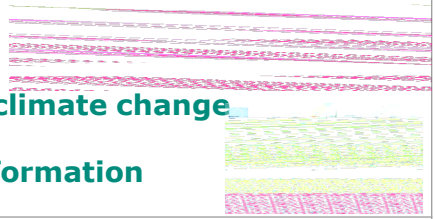
GEOSS Platform Plus in a nutshell

Who	European GEOSS Platform Component operators **ESA** (led) **CNR-IIA** and **UNIGE**. (**Eversis** i.s.t. ESA.)
With	In coordination with GEO partners (**GEOSec, GIDTT, GPOT**) … Possible **collaboration** with AllAtlantic, e-shape, Eiffel, Harmonia, GWP Activities, … Results from the **EDGE** project
When	1st January **2022** - 31st December **2024** (Involvement subcontractors planned by Q2 2022.)
Why	Response to call **H2020-IBA-CROSS-GEOSS-2021** "Delivery of knowledge for climate adaptation and mitigation through the GEOSS infrastructure".
Main Drivers	Priorities identified, Lessons-learned, requirements expressed from • the **European Green Deal** • the evaluation of the implementation of the **EU Strategy on Adaptation to climate change** (COM(2018)738) • the **Mission on Adaptation to Climate Change including Societal Transformation**
Grant	**€2,500,000 -** *500.000 Open Call*



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GPP High-Level Objectives

Improving the experience of the GEOSS users on usage of services and knowledge

Exploiting the potential of the GEOSS infrastructure to the maximum extent

Increasing access to and use of heterogeneous data (in situ, regional and national GEOSS Data)

Delivering GEOSS services and knowledge (for climate change adaptation and mitigation)

Reinforce European Participation in GEOSS

Global Earth Observation System of Systems

In-situ

Knowledge Generation

Actionable Knowledge

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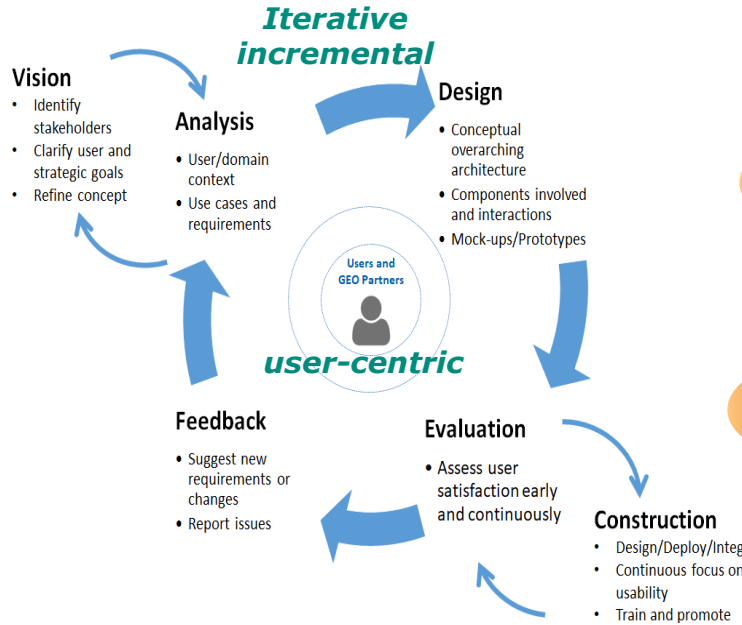
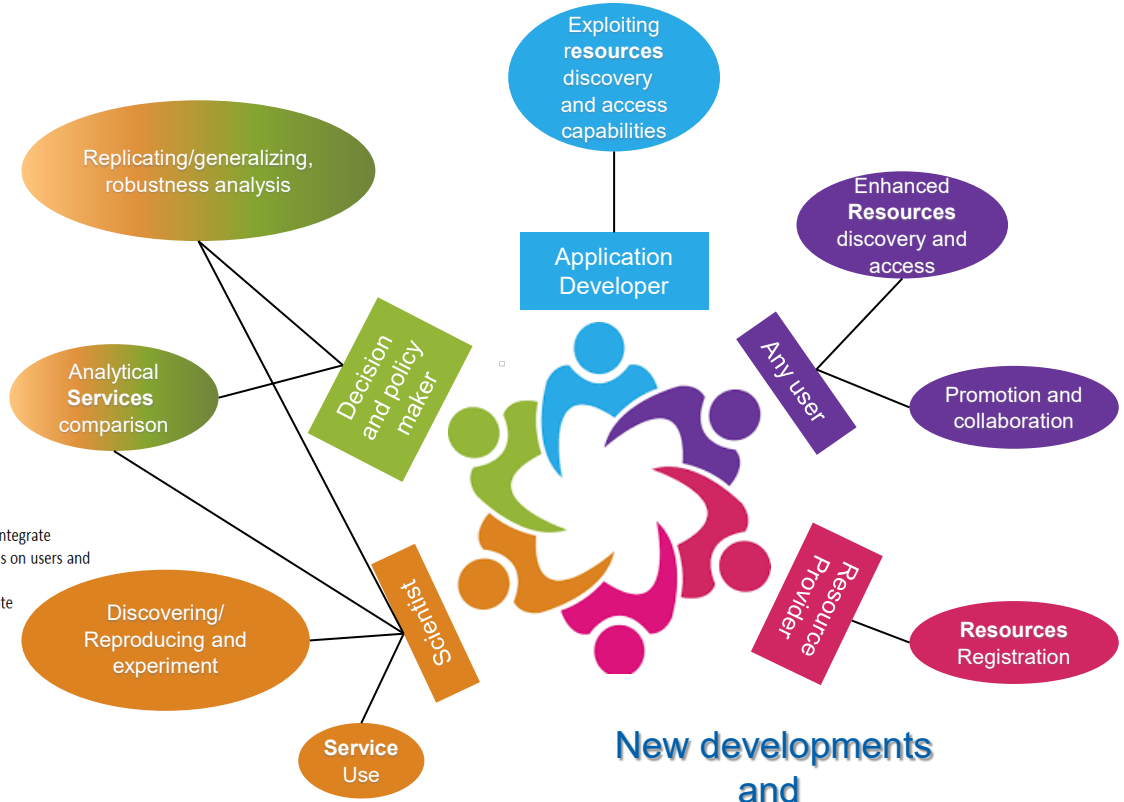
User Centric Approach





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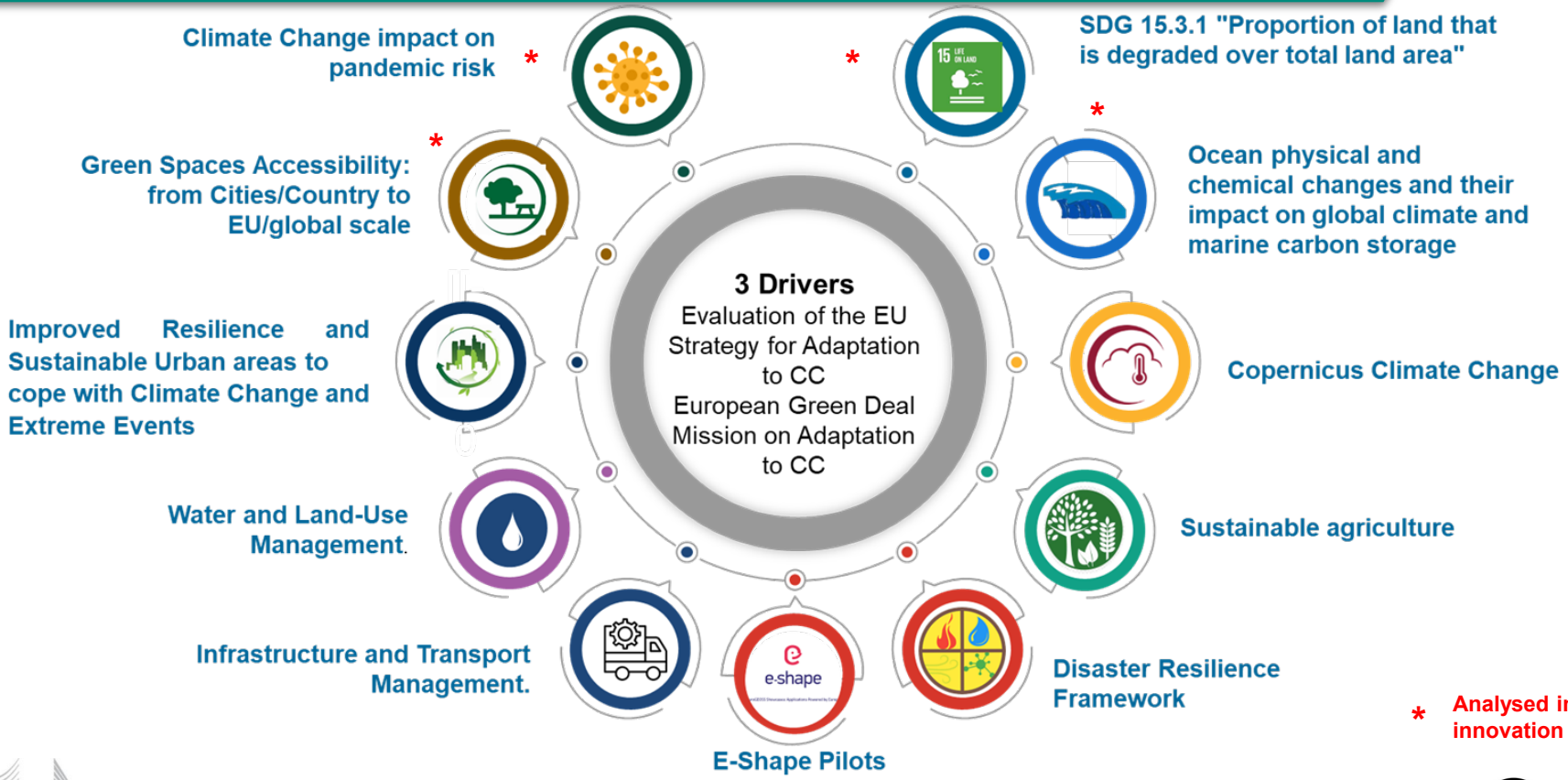
Application Highlights



* Analysed in the 1st innovation cycle

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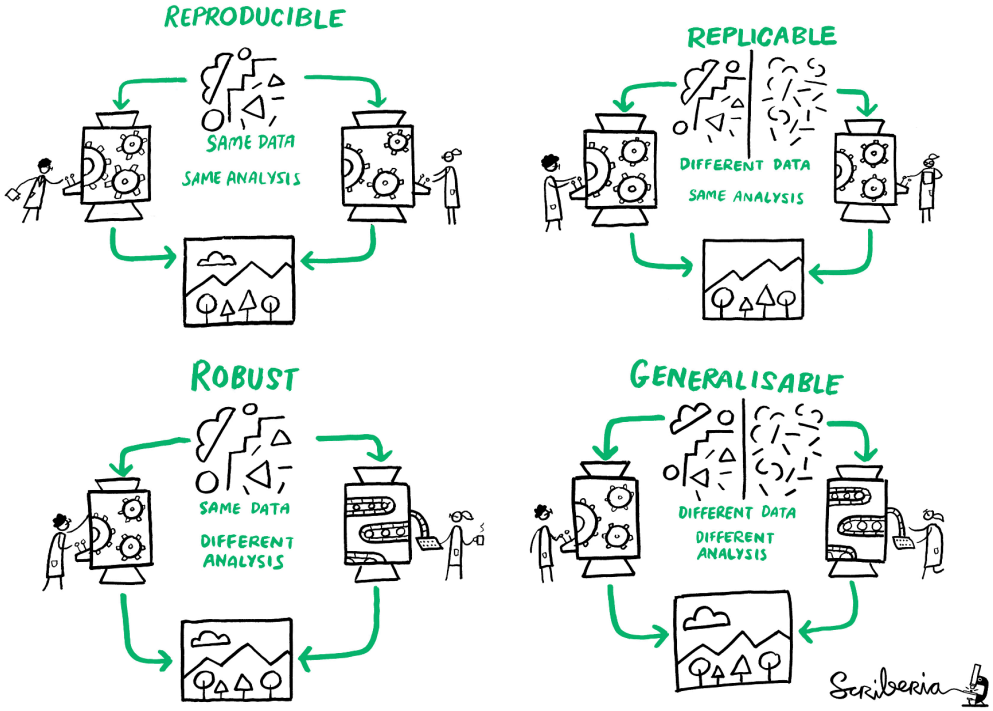
Focal Points



Experiment reproduction

In the knowledge package you find all you need to reproduce an experiment: where/what the data are, where/what the processing services are, where you can run them.

Experiment replication

In the knowledge package you find how the analysis shall be performed; you need the GEOSS Platform to find new data suited for the analysis

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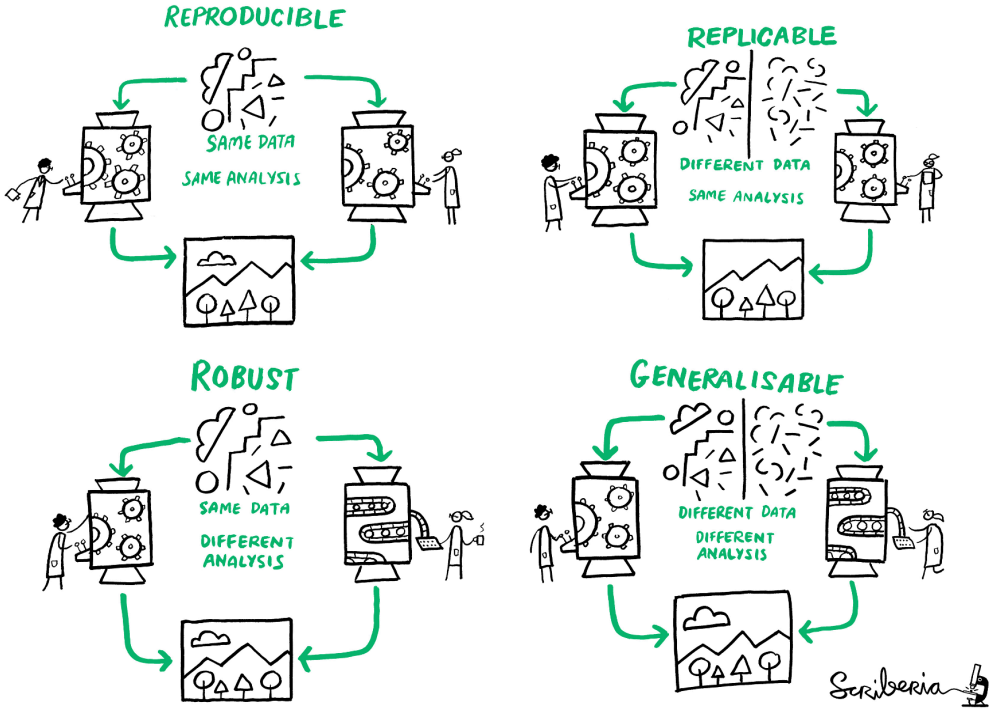
Focal Points



Experiment robustness analysis

In the knowledge package you find where/what the data are; you might need the (enhanced) GEOSS Platform to find alternative ways (models/services/other resources) to run the analysis

Experiment generalization/Reusability

In the knowledge package you find all the information concerning a given experiment. You might need the (enhanced) GEOSS Platform to build on that and find new data and new ways (models/services/other resources) to run the analysis

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SCENARIOS FOR CLIMATE CHANGE

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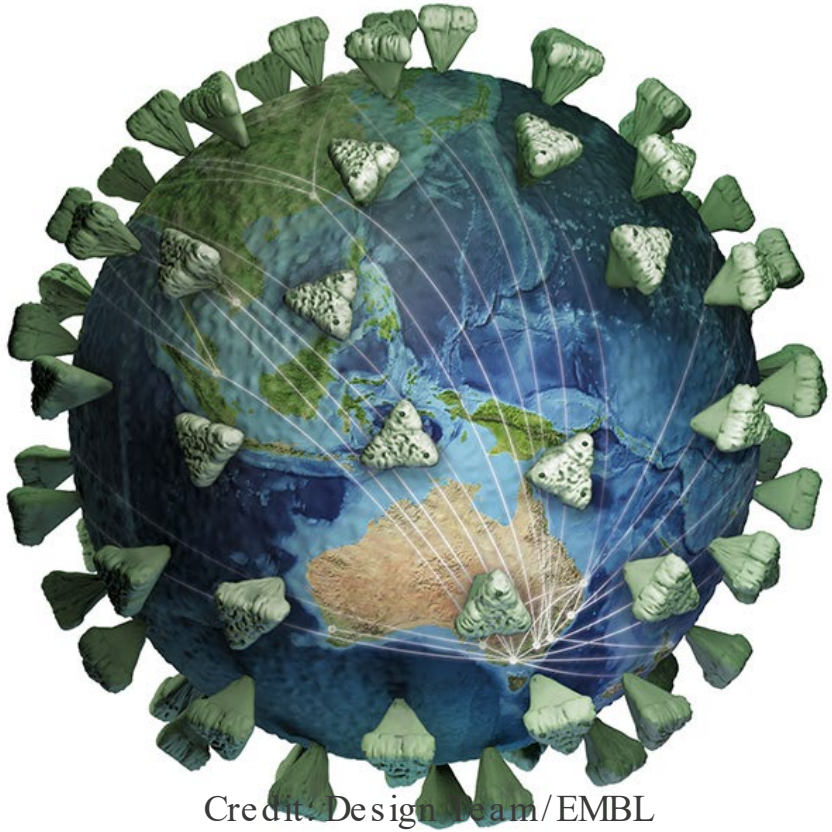
Climate Change Impact on Pandemic Risk



Credit: Design Team/EMBL

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Objective and Stakeholders

WHO

Stakeholder Identification

- Scientists working on vaccines and drugs, decision-makers on pandemic risks

NEEDS

Main Objective

- Produce norovirus epidemic/pandemic risk maps based on environmental changes

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Main System Requirements

GEO DAB

- Support of epidemiological/health data sources
- Add new relevant in-situ data sources

VLAB

- Support ML-based modelling and statistical models
- Enhance integration with GWP

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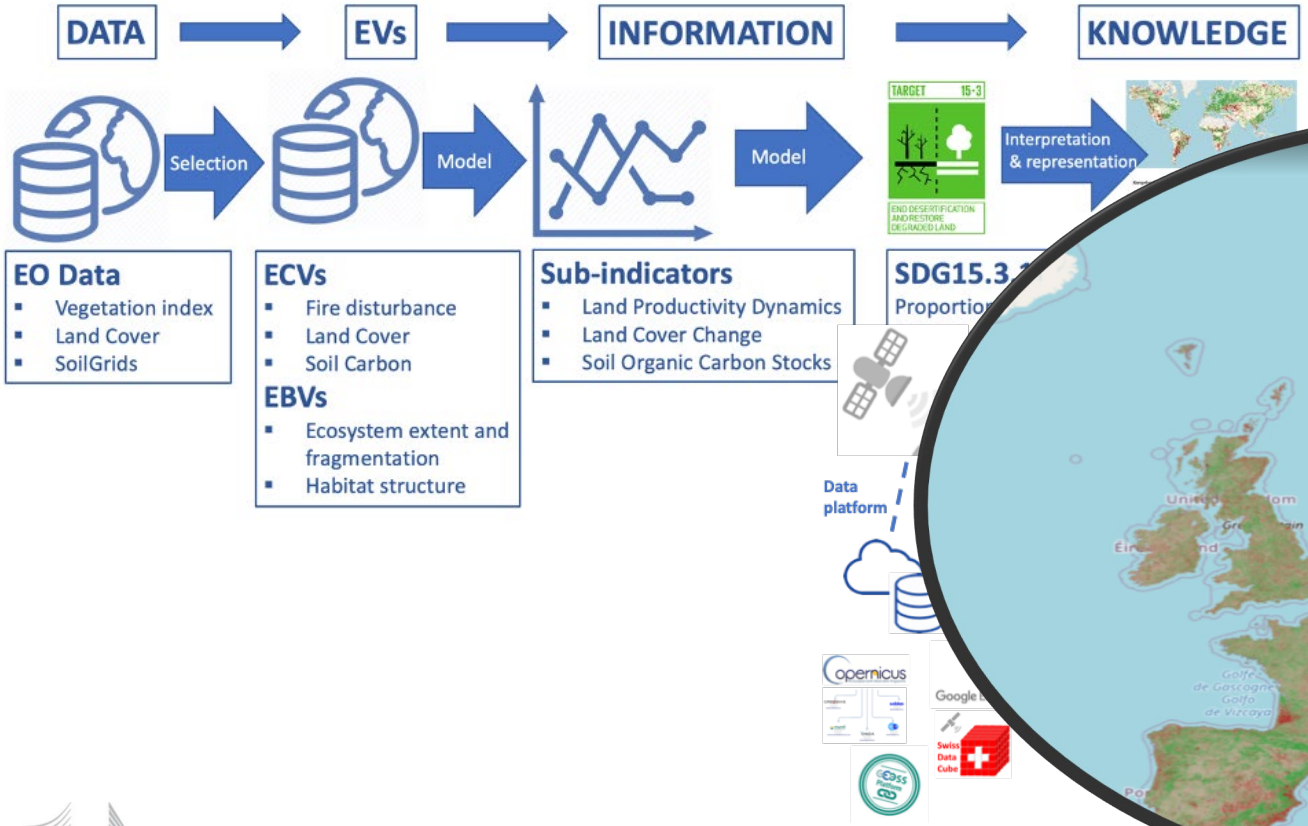
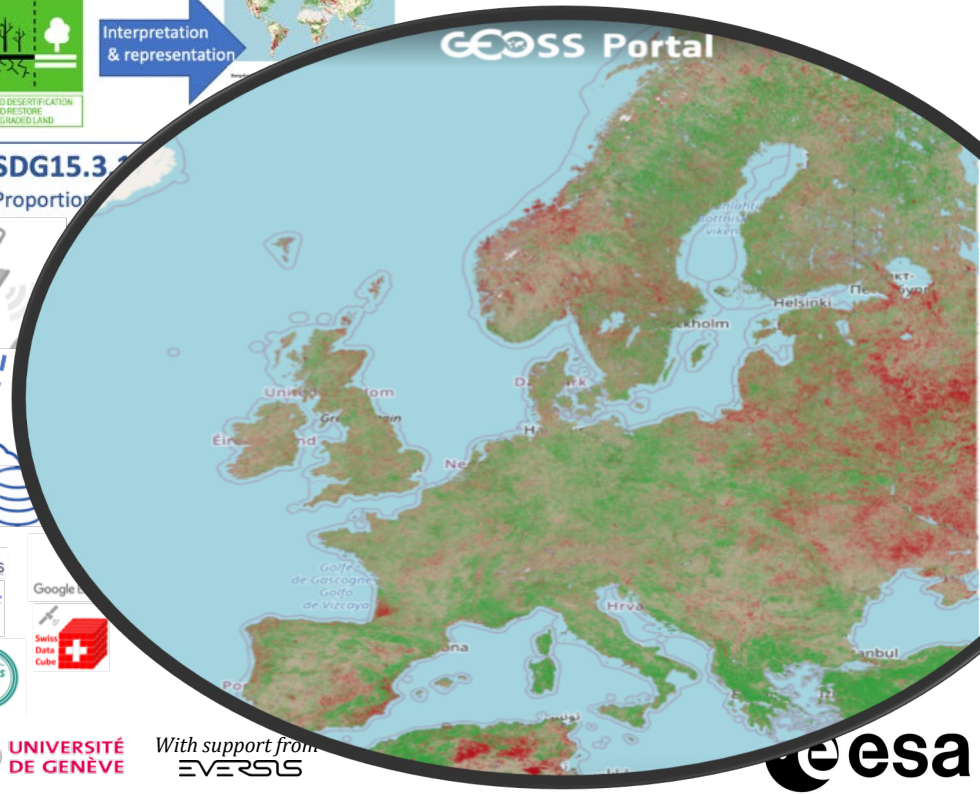
Proportion of land that is degraded over total land area

Proportion of land that is degraded over total land area





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ARCHITECTURE EVOLUTION

Architecture Evolution: the concept

Resource tier

***resource* tier**: which in a sustainable and "distributed" way, relies on the producer own heterogeneous resources, capabilities and relations;

Middleware tier

***middleware* tier**: acting as an EO concentrator, aggregating and blending resource-tier contributions, harmonising *discovery*, *access* and *use* capabilities, and possibly providing analytics and knowledge management services (e.g., self-inferring/comparing/suggesting experiments);

Application tier

***application* tier**: which benefits from the mentioned capabilities for the various information consumers of the data value chain;

Resources → **Knowledge Generation** → **Actionable Knowledge**

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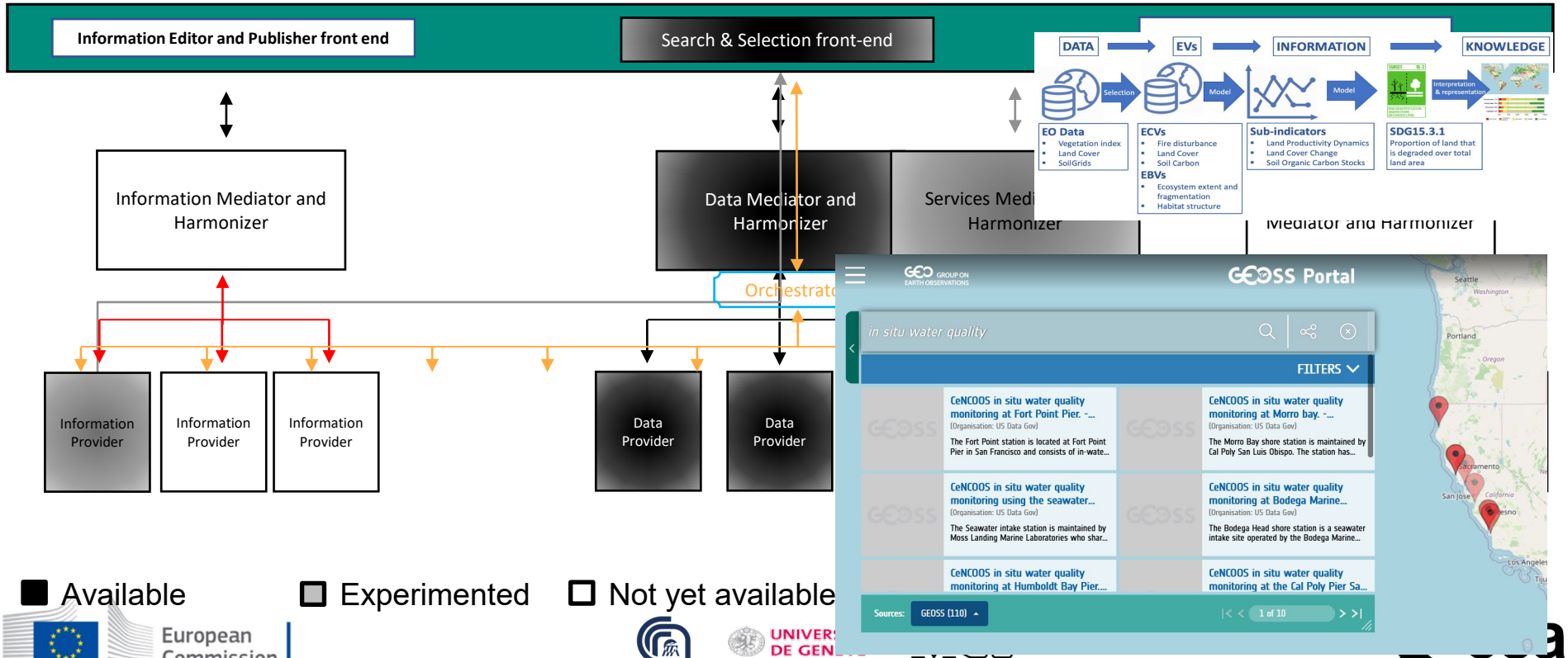
Architecture Evolution: the Logic and evolution



■ Available ☐ Experimented ☐ Not yet available

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COMPONENTS EVOLUTION

Components Evolution

GEO DAB — Enhance the support for in-situ data

Regional GEOs — Link to Regional GEOs to exploit their discovery/access/processing capabilities.

Integration with GKH for semantic discovery and knowledge generation.

Leverage cloud technologies, focusing on supporting a multi-cloud approach for knowledge generation in GEOSS

New widgets-concept / libraries which should allow for customization on stakeholder side

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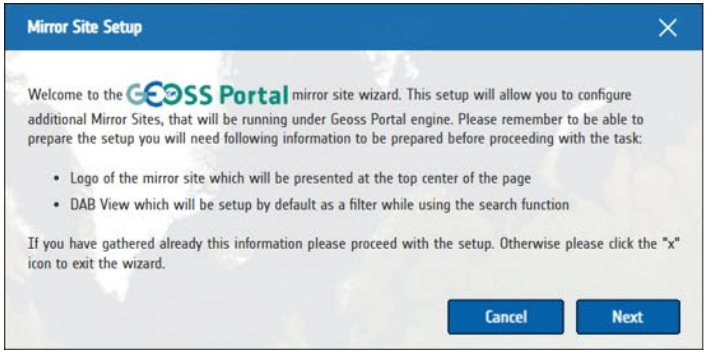
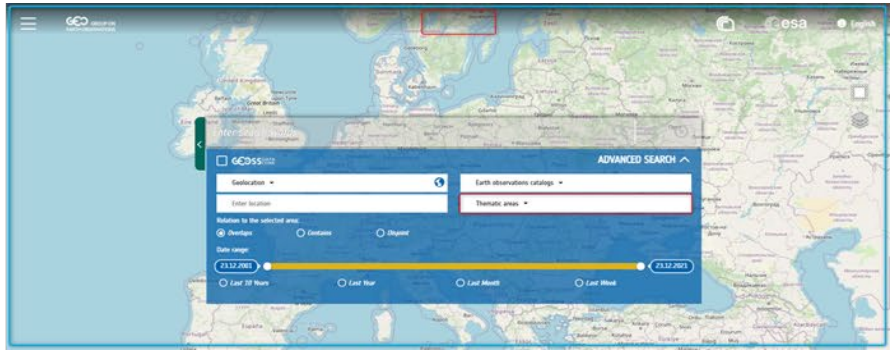
Components Evolution: User Interface Evolution

User Interface – Mirror Site setup





- Setup is done by User
- No additional development support is needed
- Mirror site can be hosted on Community premises

- Allow community to customize their portal

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Components Evolution: User Interface Evolution

User Interface – Yellow pages registration

- Dedicated form to register in Yellow pages
- Data regarding registration passed to the source
- Distributed concept of Yellow Pages (could be hosted on Regional GEO hubs)

Components Evolution: Other middleware components

Multicloud

- A dedicated middleware component to broker different cloud platforms, specifically integrating with VLab component, for the execution of scientific models on different cloud platforms

Integration with GKH

- Analyze and prototype possible VLab/GEO DAB enhancements to interact with the GEOSS Knowledge Hub (GKH) in order to fully exploit the available content

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OPEN ITT Opportunities

Additional Use cases, Applications and Middleware Development ***via open ITT***

Around *2nd half '22*
integrated in '23 & '24

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CONCLUSIONS

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Conclusions

The European GEOSS Platform providers intend to provide a contribution as part of the response to Climate Change challenges

- in close coordination with other GEOSS actors;
- benefiting from, evolving and customizing GEOSS Platform generic capabilities;
- focusing on real user needs, based on selected applications;
- providing data products, services, information, the capability to derive knowledge and the possibility to derive results input to decision makers;
- and exploiting the potential of the GEOSS Infrastructure to a maximum extent.

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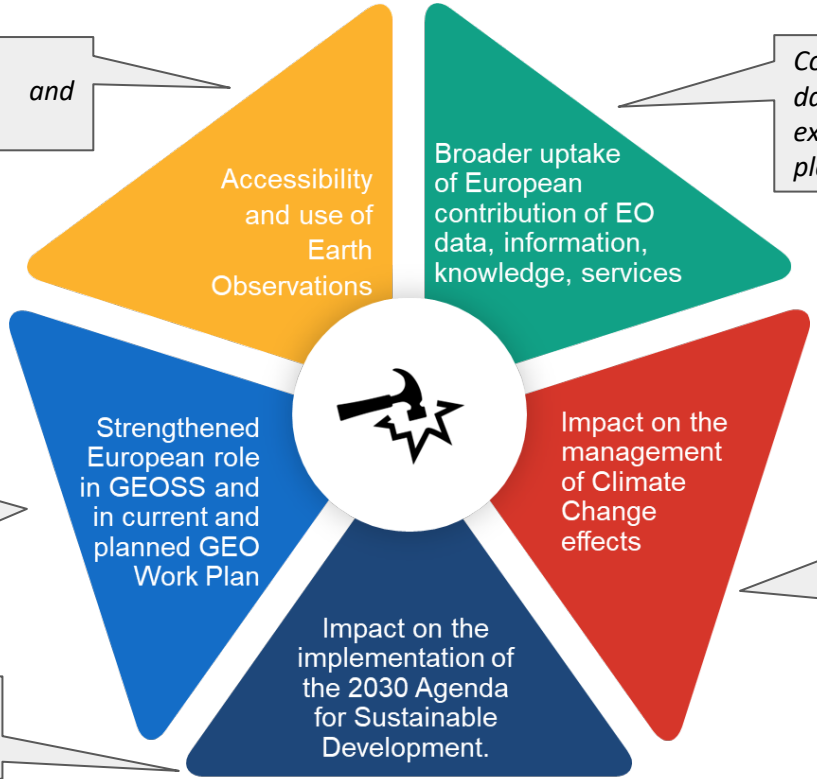
Expected Impacts

EO and non-EO, in-situ data and computational models as resources.

Connection of existing and planned EU data hubs; focus on the exploitation of existing and planned European computing platforms.



Foundational Tasks, GIDTT, GPOT, GEO Flagships, Initiatives, and Community Actions, EuroGEOSS.

with a focus on land degradation and climate change adaptation for pandemic risk.

Tools and knowledge for SDG 15 (Life on Land).

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Thank You!

Alessandro Scremin, a.scremin@rheagroup.com
Joost van Bemmelen, joost.van.bemmelen@esa.int
Paolo Mazzetti, paolo.mazzetti@cnr.it
Gregory Giuliani, Gregory.Giuliani@unige.ch

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