GEOSS Platform Plus

D2.6

Functional and non-functional enhancements specification v3.0

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Abstract:
This document describes the generic scenarios and the system requirements derived from the analysis of the use cases and user requirements collected in the third and final project cycle.
A generic scenario is the result of a functional analysis, representing a concept which is shared among different use cases. Based on these scenarios, system required capabilities (SR – System Requirements), both functional and non-functional, are identified and documented.
For each system requirement, its priority is identified along with the GEOSS Platform components that are affected. Prioritization is managed through an Agile approach and is connected to the objectives of the call.

Document Log

Date	Author	Changes	Version	Status
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Executive Summary

This document describes generic scenarios and the system requirements derived from the analysis of the use cases and user requirements collected in [RD-3]GPP-DEL-WP2-D2.5-v1.0 Use Cases Description and User Requirements Document v3.
A generic scenario is the result of a functional analysis, representing a concept which is shared among different use cases. Based on these scenarios, system required capabilities (SR – System Requirements), both functional and non-functional, are identified and documented.
For each system requirement, GEOSS Platform components are identified along with its priority. Prioritization is managed through an Agile approach and is connected to the objectives of the call, in particular the provision of actionable information and the achievement of reproducibility, reusability and replicability.
The capabilities considered in this document include the need for users to discover, access and use heterogeneous resources, along with relationships and dependencies between each other, as well as the need for resource providers to "provide", i.e., expose to the interested audience, resources for easily sharing.
The mentioned *resources*, might be *Data* (satellite, in situ, airborne, etc.), *Services*, e.g., software applications (processing services) implementing a "model" used in an experiment; *Information* such as experiment results, value added products, and also websites, publications, etc.

These resources need to be linkable through well-defined *relationships*: e.g., when users find an experiment result, they shall be enabled to easily gain details regarding how the experiment was originally set-up, references to the *Service* (or details regarding the model) and the *Data* used, with identification of all the steps (recipe). These relationships are essential for supporting *knowledge* acquisition. The concept of *reproduce, replicate or reuse* experiments is detailed in chapter 4.

Discovery refers to the capability for the user to search for resource(s) of interest based on defined criteria and find them; It involves an **inspection** capability for users to browse through a list of resources (typically the outcome of a search), analyse the metadata (which might include feedback directly provided by other users), visualize the metadata on a map, perform analysis operations on the metadata (e.g. statistical analysis on the metadata) etc. It also involves a **selection** capability to choose one or more particular resource(s), as a consequence of inspection.

Access refers to the capability for users or user applications to reach the resource(s) of interest for use in an analysis (e.g., statistical analysis on the data, and time-series analysis) or simulation (e.g., forecasting). This may include visualization and might include a download, depending on the type of resource(s) and on the intended use.

Use refers to the exploitation of the accessed resource(s) for the user's purpose (analysis, processing, simulation). This might be the execution of a computation that, according to a given model or algorithm, implemented by a Service, transforms the input data into value added products.

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1. Introduction

1.1. Purpose and Scope

This document describes the generic scenarios and the system requirements derived from the analysis of the use cases and user requirements elicited in GPP-DEL-WP2-D2.5-v1.0 Use Cases Description and User Requirements Document v3[RD-3].
A generic scenario is the result of the functional analysis, representing a concept which is shared among different use cases. Based on these scenarios, the system required capabilities (SR – System Requirements), both functional and non-functional, are identified and documented.
For each system requirement, the GEOSS Platform components involved in the implementation are identified, along with its priority. Prioritization is managed through an Agile approach and is connected to the objectives of the call.

1.2. Document Organisation

The document is organized as it follows:

- Section 1 - Introduction: describes the purpose and scope of the document and its organization.
- Section 2 - Context and System Perspective: provides an overview of the system being enhanced and of its main components.
- Section 3 - User requirements summary: briefly describes the use cases and user requirements that drive the specification of the system requirements in this document, along with the involved user communities.
- Section 4 – Generic Scenarios deriving from the analysis of the user community's needs: describes the generic scenarios deriving from the analysis of the use cases and user requirements elicited from the user communities.
- Section 5 - System required capabilities: describes the detailed, specific requirements deriving from the above-mentioned user needs.
- Section 6 - Requirements traceability matrix: Traces the system requirements to the user requirements and the generic scenarios to the system requirements.
- Annex A - References: List the references used in the document.
- Annex B - Figures and Tables: Provides links to figures and tables in the document.
- Annex C – Terminology: explains the meaning of the acronyms and definitions used in the document.

1.3. Changes to the previous version

This document (D2.6) describes the generic scenarios and system requirements deriving from the generalization and analysis of the user requirements described in GPP-DEL-WP2-D2.5-v1.0 Use Cases Description and User Requirements Document v3[RD-3].
With respect to the previous version, the following system requirements have been added:

- SR-FUN-014 – Support Sentinel Product Coverage
- SR-FUN-015 – Support ML models
- SR-FUN-016 – AI-Powered Data Discovery and Access
- SR-FUN-017 – GEOSS Portal Landing Page

Moreover, the new requirements included in D2.5 [RD-3], including those concerning the new applications Gross Primary Production for Monitoring Ecosystem Health within GEOSS (AGAME) and Harmonized In-Situ Data for crop mapping (MAPS4GPP), have been mapped opportunely to the already existing system requirements.

2. Context and System Perspective

The Global Earth Observation System of Systems (GEOSS) is a social and software ecosystem sharing independent and open Earth observation (EO) information and processing services.
GEOSS connects and coordinates a large array of observing systems, data systems and processing services to strengthen monitoring of the state of the Earth. It facilitates the sharing of environmental data and information collected by countries and organizations within GEO.
The GEOSS (Global Earth Observation System of Systems) Platform, enables users to access worldwide Earth observation data and information. As one of the official GEOSS Platform components providers, ESA ensures the short and medium-term operational development of the GEOSS Portal, the unique web-based entry-point to EO-data.
Through the GEOSS Platform Plus (GPP) project, ESA, in close collaboration with the GEO partners, will contribute to the evolution of the GEOSS Platform and the GEOSS infrastructure from a functional and architectural viewpoint with the aim respectively:

- to make accessible tailor-made information and actionable knowledge by users, focusing on services to non-specialists in the domain of adaptation to extreme climatic events and to changes in climatic conditions, and
- to enable full exploitation of the GEOSS infrastructure and its components, in particular the GEOSS Infrastructure Development Task Team (GIDTT) accepted evolutions, and by driving the use of current trends in information technology, so that users can experience a user-friendly, up-to-date and therefore familiar environment.

2.1. System Overview

Figure 1 provides an overview of the GEOSS Platform, its "connecting" between users and data providers and its components.

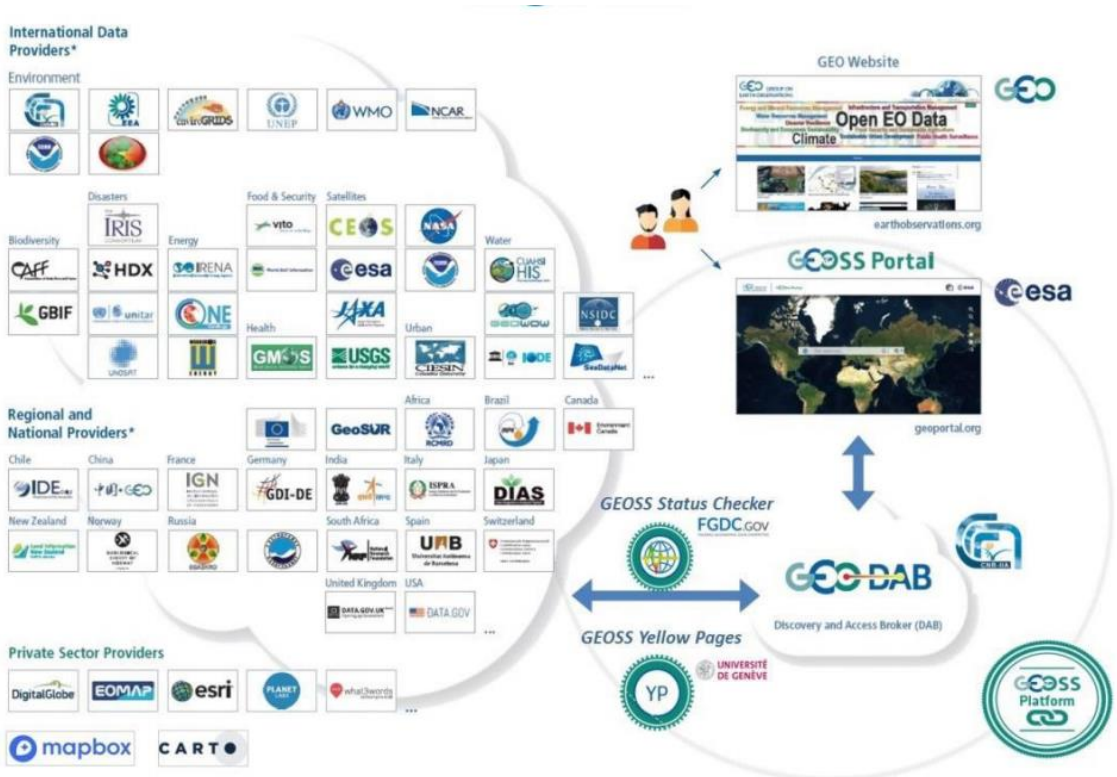

Figure 1: GEOSS Platform Overview

The **GEO Discovery and Access Broker (GEO DAB)** is the primary mechanism by which all data and information is discovered and accessed. The GEO DAB implements the necessary

mediation and harmonization services through Application Program Interfaces (APIs). These APIs allow data providers to share resources without having to make major changes to their technology or standards.

The **GEOSS Portal** (www.geoportal.org) is an online map-based user interface which allows users to discover and access Earth observation data and resources from different providers from all over the world. It connects users to existing databases and portals and provides reliable, up-to-date and user-friendly information – vital for the work of decision makers, planners and emergency managers. The portal is implemented and operated by the European Space Agency and provides a single internet discovery and access point to the ever-growing quantities of heterogeneous collections of Earth observations from satellites, airplanes, drones and in-situ sensors at global, regional and local scales.

The **GEOSS Yellow pages** service implements the simplified registration process for new Data Providers.

The **GEOSS Service Status Checker** is the component, developed by USGS/FGDC and integrated into the GEO DAB, which aims at improving user experience by providing information on Reliability of Services. The Status Checker is an automatic mechanism to monitor, diagnose and alert data providers and users on the health status of the web services provided by the GEOSS Platform.

In addition to the above-described main components of the Platform, GEOSS offers the so-called **Reuse Components** to serve the specificities of the various user communities. This means that user communities, which might have their own data, portals and corresponding specific needs, can reuse some of the GEOSS Platform components customized and tailored to their specific requirements.

The Reuse Components are:

- The *GEOSS View*, which provides access to a subset of specifically defined GEOSS resources using temporal, thematic and spatial criteria;
- The *GEOSS APIs*, which expose the discovery and access functionalities of the GEO DAB and as such can be exploited by user communities' client applications or portals;
- The *GEOSS Mirror* is a GEOSS Portal site customization for SBAs, Flagships, Initiatives, and Communities. The customization better serves the specific community interests by filtering catalogues and search results by a specific theme or GEO DAB view, location of interest, etc.
- The *GEOSS Widget* is a freely-available instantiation of selected GEOSS Portal widgets made available for possible customization in various areas of application (e.g. a specific SBA, Initiatives, etc.). This is accomplished by publishing portal code parts (widgets) wrapped up in API.

It is foreseen to integrate the **GEO Knowledge Hub** (GKH) with the GEOSS Platform, the aim of this integration is to enable GEOSS users to have access to methods, algorithms, software and reports available in the GKH.

The general idea for this path of evolution of the GEOSS Platform is the concept of developing and delivering knowledge packages via the GKH. A knowledge package is a complete, curated set of data, software, products, and reports that enables replication of an EO application. Organizing a knowledge package requires combining the access to data with the access to the resources (models, algorithms, specifications, fit for use, results, etc.) required to make use of the data. It also requires that the resulting knowledge package be organized inside the GEOSS Platform to make it easily discoverable, understandable, accessible, and usable.

3. User requirements summary

The sources of the system requirements are the use cases described in D2.5 [RD-3] along with the user requirements and summarized as follows:

- **Cross-thematic** use cases such as those relevant to:
  - **Community Portal Self-Creation Tool:** Developers in a community can set up their own portals to access Earth observations relevant to their needs. Registered users can create these portals through dedicated templates. Communities can make their portals available on the GEOSS Community portal, pending approval from the governance body.
  - **GEOSS Yellow Pages Management:** Data providers can register themselves and their metadata sources on the GEOSS Yellow Pages. The Yellow Pages, hosted by UNIGE, manage Data Provider registrations, in compliance with the General Data Protection Regulation (GDPR).
  - **Semantically Enabled Free-Text Search:** A cognitive search module, developed in the context of the EIFFEL H2020 project [RD-6], enhances data discovery in GEOSS datasets with semantic-enabled search options.
  - **AI-Powered Data Discovery and Access:** A Proof of Concept (PoC) for an Artificial Intelligence (AI)-powered search feature that, using Machine Learning (ML), improves user experience and data accessibility, thus supporting environmental and policy goals.
  - **Landing Page:** The GEOSS Portal's landing page aims to increase user engagement by highlighting platform features, applications and benefits.
- **Thematic uses** as regards:
  - **SDG15.3.1 - Land Degradation** Users can calculate the Sustainable Development Goal (SDG) indicator 15.3.1 for land degradation at the national level using the GEOSS platform.
  - **European Marine Observation and Data Network (EMODnet) Data Access:** Users can search and access EMODnet [RD-8] data and related information within GEOSS.
  - **Access to regional and local infrastructure and urban development data:** Users can find data relevant to regional and local infrastructure and urban development, including data from Eiffel [RD-6] Pilots 3 and 4 respectively.
  - **AfriGEOSS Community Portal**: provides functionalities for discovering and visualizing Earth observation data specific to Africa.
  - **Climate Change Impact on Norovirus Pandemic Risk** Users can study the risk of Norovirus outbreaks due to climate change using GEOSS data, although this is still in early stages due to data access barriers.
  - **SDG11.7 - Accessibility to Urban Green Spaces** Users can calculate urban green space accessibility (SDG 11.7) at the city level using GEOSS, addressing issues related to urban sprawl and efficient land use.
  - **Nutrient Pollution in European Inland and Coastal Waters** A model developed by CNR-IIA in collaboration with the Joint Research Center (JRC) helps users quantify nutrient pollution in European waters, supporting the EU's Zero Pollution Action Plan.

- **Above Ground Biomass (AGB)** Users can map biomass using remote sensing imagery and machine learning models via GEOSS, relevant for carbon stock quantification and ecosystem services.
- **Gross Primary Production for Monitoring Ecosystem Health within GEOSS (AGAME):** Users can access time series data on gross primary production to study carbon uptake and predict biosphere conditions, integrated into GEOSS for broader accessibility.
- **Harmonized In-Situ Data for crop mapping (MAPS4GPP):** Users can generate crop maps using harmonized in-situ reference data to train classification algorithms, improving the quality of agricultural indicators.
- **Climate Change Data on Urban Heat Fluxes in Milan (HARMONIA):** Researchers can access Harmonia project [RD-7] data on urban heat fluxes via GEOSS to study climate impacts in Milan, informing urban planning and mitigation strategies.

4. Generic scenarios

The use cases elicited by the user communities described in D2.5 [RD-3] have been analyzed to the purpose of identifying the corresponding generic scenarios. A generic scenario is the result of the functional analysis, representing a concept which is shared among different use cases. Based on these scenarios, the system required capabilities (SR – System Requirements), both functional and non-functional, are identified and documented.
They are listed in the table below, along with the use cases (user community – specific) from which they derive. Please refer D2.5 [RD-3] for details regarding the mentioned source use cases and corresponding user requirements.

Table 1 Generic scenarios deriving from the user scenarios

#	User Category	Title	Description	Source
S1	Any	Resources discovery and access with linked information (relationships)	Search for resources of interest (e.g. data, information, URL, documents, thematic communities, aggregated indicators, scientific articles, cloud platforms, scientific workflows provided by different organizations, services) based on criteria of interest. Presentation of search results with possibility to select and inspect search results of interest, navigate through linked (context) information (and other linked resources) and, if possible, visualise them on a map.	UC-CSP-01 – Community Portal self-creation UC-ECS-01 – Semantically-enabled free text search UC-AIP-01 – AI Powered Data Discovery UC-LDG-01 – SDG15.3.1 Towards knowledge generation on Land Degradation UC-ATC-01 – EMODnet Physics experiment access UC-MEB-01 – EMODnet Seabed Habitats - Ospar experiment access UC-MEB-02 – EMODnet Seabed Habitats experiment access: helping to identify previously unknown soft coral habitats UC-MEB-03– EMODnet Seabed Habitats experiment access: mapping ecosystem services provided by benthic habitats in the European North Atlantic Ocean UC-MEB-04 – EMODnet Seabed Habitats experiment access – Ospar intermediate assessment UC-MEB-05 – EMODnet Biology experiment access UC-MEB-06 – EMODnet Biology experiment access: Preventing the introduction of non-indigenous species UC-MEB-07 – Joint Copernicus Marine - EMODnet experiment access: Tracking whales in the North Atlantic UC-MAC-01 – EMODnet Chemistry experiment access: Supporting the analysis of EU baselines

				UC-MAC-02 – EMODnet Chemistry experiment access: Marine Litter - action on single use plastics and fishing gear (contribution to EC impact assessment) UC-MAB-01 – EMODnet bathymetry experiment access: Enhancing marine topographical data discovery and access in the North Atlantic UC-EIF-01 – Access to the Eiffel Pilot 3 Infrastructure & Transport Management Regional Scale and corresponding data UC-EIF-02 - Access to the Eiffel Pilot 4 Sustainable Urban Development Local | Regional Scale and corresponding data UC-AFG-02 – Discovery and visualization of resources from AfriGEOSS UC-GSA-01 – SDG11.7: Accessibility to Urban Green Spaces UC-AGA-01 – Discovery, access, usage and uptake of Gross Primary Production data product UC-MPS-03 – Exploring and leveraging the WorldCereal harmonized in-situ reference data repository UC-MPS-04 – Generate crop maps UC-HAR-01 Accessing Climate Change Data on Urban Heat Fluxes in Milan
S2	Scientist	Service Use	Search for a service (e.g., for generation of Value-Added Products, or indicators), selection of a particular search result, definition of service parameters, discovery and selection of input data and service execution. Presentation of indication of time needed for service execution. Presentation of service execution results. Inspection (including possibly visualisation on map) and use of them.	UC-LDG-01 – SDG15.3.1 Towards knowledge generation on Land Degradation UC-CCP-01 – Climate Change Impact on Norovirus Pandemic Risk UC-CCP-02 – The effect of Environment on NOROVIRUS infectious events. UC-GSA-01 – SDG11.7: Accessibility to Urban Green Spaces UC-JRC-01 – Water Lifecycle UC-JRC-02 – Above Ground Biomass UC-MPS-04 – Generate crop maps UC-AGA-01 – Discovery, access, usage and uptake of Gross Primary Production data product

S3	Resource Provider	Resources Registration	Making resources discoverable, accessible and usable via GEOSS.	UC-CSP-01 – Community Portal self-creation UC-LDG-01 – SDG15.3.1 Towards knowledge generation on Land Degradation UC-ATC-01 – EMODnet Physics experiment access UC-MEB-01 – EMODnet Seabed Habitats - Ospar experiment access UC-MEB-02 – EMODnet Seabed Habitats experiment access: helping to identify previously unknown soft coral habitats UC-MEB-03– EMODnet Seabed Habitats experiment access: mapping ecosystem services provided by benthic habitats in the European North Atlantic Ocean UC-MEB-04 – EMODnet Seabed Habitats experiment access – Ospar intermediate assessment UC-MEB-05 – EMODnet Biology experiment access UC-MEB-06 – EMODnet Biology experiment access: Preventing the introduction of non-indigenous species UC-MEB-07 – Joint Copernicus Marine - EMODnet experiment access: Tracking whales in the North Atlantic UC-MAC-01 – EMODnet Chemistry experiment access: Supporting the analysis of EU baselines UC-MAC-02 – EMODnet Chemistry experiment access: Marine Litter - action on single use plastics and fishing gear (contribution to EC impact assessment) UC-MAB-01 – EMODnet bathymetry experiment access: Enhancing marine topographical data discovery and access in the North Atlantic UC-EIF-01 – Access to the Eiffel Pilot 3 Infrastructure & Transport Management Regional Scale and corresponding data UC-EIF-02 - Access to the Eiffel Pilot 4 Sustainable Urban Development Local | Regional Scale and corresponding data UC-AFG-01 – AfriGEOSS Community Portal

				UC-MPS-01 - Host WorldCereal repository UC-MPS-02 - Register in-situ data providers UC-AGA-02 – Integration of Gross Primary Production as element of the eLTER Information Cluster UC-AGA-03 – Integration of Gross Primary Production data product into the GEOSS environment
S4	Any	Promotion and collaboration	Creation, curation and sharing of information regarding resources of interest, through mediated collaboration. Promotion of models, algorithms and scientific workflows provided by well recognized and authoritative institutions, fostering international cooperation.	UC-LDG-01 – SDG15.3.1 Towards knowledge generation on Land Degradation UC-ATC-01 – EMODnet Physics experiment access UC-MEB-01 – EMODnet Seabed Habitats - Ospar experiment access UC-MEB-02 – EMODnet Seabed Habitats experiment access: helping to identify previously unknown soft coral habitats UC-MEB-03– EMODnet Seabed Habitats experiment access: mapping ecosystem services provided by benthic habitats in the European North Atlantic Ocean UC-MEB-04 – EMODnet Seabed Habitats experiment access – Ospar intermediate assessment UC-MEB-05 – EMODnet Biology experiment access UC-MEB-06 – EMODnet Biology experiment access: Preventing the introduction of non-indigenous species UC-MEB-07 – Joint Copernicus Marine - EMODnet experiment access: Tracking whales in the North Atlantic UC-MAC-01 – EMODnet Chemistry experiment access: Supporting the analysis of EU baselines UC-MAC-02 – EMODnet Chemistry experiment access: Marine Litter - action on single use plastics and fishing gear (contribution to EC impact assessment) UC-MAB-01 – EMODnet bathymetry experiment access: Enhancing marine topographical data discovery and access in the North Atlantic UC-EIF-01 – Access to the Eiffel Pilot 3 Infrastructure & Transport

				Management Regional Scale and corresponding data UC-EIF-02 - Access to the Eiffel Pilot 4 Sustainable Urban Development Local | Regional Scale and corresponding data UC-AFG-01 – AfriGEOSS Community Portal UC-LPG-01 – Landing Page UC-AGA-01 – Discovery, access, usage and uptake of Gross Primary Production data product UC-AGA-02 – Integration of Gross Primary Production as element of the eLTER Site Information Cluster UC-AGA-03 – Integration of Gross Primary Production data product into the GEOSS environment UC-MPS-01 - Host WorldCereal repository UC-MPS-03 – Exploring and leveraging the WorldCereal harmonized in-situ reference data repository UC-MPS-04 – Generate crop maps
S5	Resources Providers	Data providers (registration)	Registration of resources providers to GEOSS	UC-YGP-01 - Registration to the GEOSS Yellow Pages UC-MPS-02 - Register in-situ data providers UC-AGA-02 – Integration of Gross Primary Production as element of the eLTER Site Information Cluster UC-AGA-03 – Integration of Gross Primary Production data product into the GEOSS environment
S6	Application Developer	Exploiting discovery and access capabilities	Exploitation of GEOSS capabilities and resources in/from community infrastructure, via community portals, machine to machine interface, widgets, etc.	UC-CSP-01 – Community Portal self-creation UC-LDG-01 – SDG15.3.1 Towards knowledge generation on Land Degradation UC-AFG-01 – AfriGEOSS Community Portal UC-JRC-01 – Nutrient Pollution in European Inland and Coastal Waters UC-MPS-03 – Exploring and leveraging the WorldCereal harmonized in-situ reference data repository UC-MPS-04 – Generate crop maps UC-GSA-01 – SDG11.7: Accessibility to Urban Green Spaces

S7	Scientist	Discovering an experiment/ research result	Discover an experiment, including its results and associated relationships e.g. the references to Data and Services used in the experiment. A search can be done based on several criteria, such as time-frame, location, theme, Data, Service, results, etc. The search outcomes could then be displayed in a list or on a map from which they can be inspected, selected if of interest and possibly accessed for use (or saved for future use). The search outcomes should be well-structured to enable reproduction of the experiment: this should include indication of the paper describing the experiment (or a recipe) with the possibility to access it and information on how to access the (in-situ, satellite, …) Data and the Service used.	UC-LDG-01 – SDG15.3.1 Towards knowledge generation on Land Degradation UC-ATC-01 – EMODnet Physics experiment access UC-MEB-01 – EMODnet Seabed Habitats - Ospar experiment access UC-MEB-02 – EMODnet Seabed Habitats experiment access: helping to identify previously unknown soft coral habitats UC-MEB-03– EMODnet Seabed Habitats experiment access: mapping ecosystem services provided by benthic habitats in the European North Atlantic Ocean UC-MEB-04 – EMODnet Seabed Habitats experiment access – Ospar intermediate assessment UC-MEB-05 – EMODnet Biology experiment access UC-MEB-06 – EMODnet Biology experiment access: Preventing the introduction of non-indigenous species UC-MEB-07 – Joint Copernicus Marine - EMODnet experiment access: Tracking whales in the North Atlantic UC-MAC-01 – EMODnet Chemistry experiment access: Supporting the analysis of EU baselines UC-MAC-02 – EMODnet Chemistry experiment access: Marine Litter - action on single use plastics and fishing gear (contribution to EC impact assessment) UC-MAB-01 – EMODnet bathymetry experiment access: Enhancing marine topographical data discovery and access in the North Atlantic UC-EIF-01 – Access to the Eiffel Pilot 3 Infrastructure & Transport Management Regional Scale and corresponding data UC-EIF-02 - Access to the Eiffel Pilot 4 Sustainable Urban Development Local | Regional Scale and corresponding data UC-CCP-01 – Climate Change Impact on Norovirus Pandemic Risk UC-CCP-02 – The effect of Environment on NOROVIRUS infectious events.

				UC-GSA-01 – SDG11.7: Accessibility to Urban Green Spaces UC-JRC-01 – Nutrient Pollution in European Inland and Coastal Waters UC-JRC-02 – Above Ground Biomass UC-MPS-03 – Exploring and leveraging the WorldCereal harmonized in-situ reference data repository UC-MPS-04 – Generate crop maps UC-AGA-01 – Discovery, access, usage and uptake of Gross Primary Production data product
S8	Scientist	Reproducing an experiment/ research activity	Exact reproduction of an experiment (e.g., for peer review purposes) and regeneration of the result. Specifically, this involves discovery and access of information (as described in S7) to be able to follow the steps and guidelines described. For example, the paper can be accessed to repeat the steps described in it (or other recipe book), access the referenced Service and use it, with the provided Data references as inputs.	UC-LDG-01 – SDG15.3.1 Towards knowledge generation on Land Degradation UC-ATC-01 – EMODnet Physics experiment access UC-MEB-01 – EMODnet Seabed Habitats - Ospar experiment access UC-MEB-02 – EMODnet Seabed Habitats experiment access: helping to identify previously unknown soft coral habitats UC-MEB-03– EMODnet Seabed Habitats experiment access: mapping ecosystem services provided by benthic habitats in the European North Atlantic Ocean UC-MEB-04 – EMODnet Seabed Habitats experiment access – Ospar intermediate assessment UC-MEB-05 – EMODnet Biology experiment access UC-MEB-06 – EMODnet Biology experiment access: Preventing the introduction of non-indigenous species UC-MEB-07 – Joint Copernicus Marine - EMODnet experiment access: Tracking whales in the North Atlantic UC-MAC-01 – EMODnet Chemistry experiment access: Supporting the analysis of EU baselines UC-MAC-02 – EMODnet Chemistry experiment access: Marine Litter - action on single use plastics and fishing gear (contribution to EC impact assessment)

				UC-MAB-01 – EMODnet bathymetry experiment access: Enhancing marine topographical data discovery and access in the North Atlantic UC-EIF-01 – Access to the Eiffel Pilot 3 Infrastructure & Transport Management Regional Scale and corresponding data UC-EIF-02 - Access to the Eiffel Pilot 4 Sustainable Urban Development Local | Regional Scale and corresponding data UC-CCP-01 – Climate Change Impact on Norovirus Pandemic Risk UC-CCP-02 – The effect of Environment on NOROVIRUS infectious events. UC-GSA-01 – SDG11.7: Accessibility to Urban Green Spaces UC-JRC-01 – Nutrient Pollution in European Inland and Coastal Waters UC-JRC-02 – Above Ground Biomass UC-MPS-03 – Exploring and leveraging the WorldCereal harmonized in-situ reference data repository UC-MPS-04 – Generate crop maps UC-AGA-01 – Discovery, access, usage and uptake of Gross Primary Production data product
S9	Scientist, Decision and Policy maker	Replicating an experiment/ research activity	Replication of an experiment e.g. to generate the same kind of product in a different period. This involves discovery and access of information as described in S7, to be able to follow the steps and guidelines in there, with new data, i.e. different from the ones used in the original experiment, as inputs. For example, a paper (or other recipe book) can be accessed to repeat the steps described in it, access the referenced Service and use it for executing the computation that transforms the input data into products. The input data can be discovered based on several criteria, such as data type, time-frame, location, theme, etc.; the search	UC-LDG-01 – SDG15.3.1 Towards knowledge generation on Land Degradation UC-ATC-01 – EMODnet Physics experiment access UC-MEB-01 – EMODnet Seabed Habitats - Ospar experiment access UC-MEB-02 – EMODnet Seabed Habitats experiment access: helping to identify previously unknown soft coral habitats UC-MEB-03– EMODnet Seabed Habitats experiment access: mapping ecosystem services provided by benthic habitats in the European North Atlantic Ocean UC-MEB-04 – EMODnet Seabed Habitats experiment access – Ospar intermediate assessment UC-MEB-05 – EMODnet Biology experiment access

			outcomes can be inspected and selected if of interest as input to the Service.	UC-MEB-06 – EMODnet Biology experiment access: Preventing the introduction of non-indigenous species UC-MEB-07 – Joint Copernicus Marine - EMODnet experiment access: Tracking whales in the North Atlantic UC-MAC-01 – EMODnet Chemistry experiment access: Supporting the analysis of EU baselines UC-MAC-02 – EMODnet Chemistry experiment access: Marine Litter - action on single use plastics and fishing gear (contribution to EC impact assessment) UC-MAB-01 – EMODnet bathymetry experiment access: Enhancing marine topographical data discovery and access in the North Atlantic UC-EIF-01 – Access to the Eiffel Pilot 3 Infrastructure & Transport Management Regional Scale and corresponding data UC-EIF-02 - Access to the Eiffel Pilot 4 Sustainable Urban Development Local | Regional Scale and corresponding data UC-CCP-01 – Climate Change Impact on Norovirus Pandemic Risk UC-CCP-02 – The effect of Environment on NOROVIRUS infectious events. UC-GSA-01 – SDG11.7: Accessibility to Urban Green Spaces UC-JRC-01 – Nutrient Pollution in European Inland and Coastal Waters UC-JRC-02 – Above Ground Biomass UC-MPS-03 – Exploring and leveraging the WorldCereal harmonized in-situ reference data repository UC-MPS-04 – Generate crop maps UC-AGA-01 – Discovery, access, usage and uptake of Gross Primary Production data product

S10	Scientist, Decision and Policy maker	Reusing an experiment/ research result	Reuse of an experiment by adapting it to specific necessities and purposes. This might involve using the same or a slightly modified model and different data as inputs, using the same Service on a different region, or context, or scale; or using, if desired, a different Service. To do this, it might be needed to discover a Service of interest, based on several criteria such as resulting product, time-frame, location, theme, etc. and it might be needed as well to discover and select the input data of interest.	UC-LDG-01 – SDG15.3.1 Towards knowledge generation on Land Degradation UC-ATC-01 – EMODnet Physics experiment access UC-MEB-01 – EMODnet Seabed Habitats - Ospar experiment access UC-MEB-02 – EMODnet Seabed Habitats experiment access: helping to identify previously unknown soft coral habitats UC-MEB-03– EMODnet Seabed Habitats experiment access: mapping ecosystem services provided by benthic habitats in the European North Atlantic Ocean UC-MEB-04 – EMODnet Seabed Habitats experiment access – Ospar intermediate assessment UC-MEB-05 – EMODnet Biology experiment access UC-MEB-06 – EMODnet Biology experiment access: Preventing the introduction of non-indigenous species UC-MEB-07 – Joint Copernicus Marine - EMODnet experiment access: Tracking whales in the North Atlantic UC-MAC-01 – EMODnet Chemistry experiment access: Supporting the analysis of EU baselines UC-MAC-02 – EMODnet Chemistry experiment access: Marine Litter - action on single use plastics and fishing gear (contribution to EC impact assessment) UC-MAB-01 – EMODnet bathymetry experiment access: Enhancing marine topographical data discovery and access in the North Atlantic UC-EIF-01 – Access to the Eiffel Pilot 3 Infrastructure & Transport Management Regional Scale and corresponding data UC-EIF-02 - Access to the Eiffel Pilot 4 Sustainable Urban Development Local | Regional Scale and corresponding data UC-CCP-01 – Climate Change Impact on Norovirus Pandemic Risk UC-CCP-02 – The effect of Environment on NOROVIRUS infectious events.

				UC-GSA-01 – SDG11.7: Accessibility to Urban Green Spaces UC-JRC-01 – Nutrient Pollution in European Inland and Coastal Waters UC-JRC-02 – Above Ground Biomass UC-MPS-03 – Exploring and leveraging the WorldCereal harmonized in-situ reference data repository UC-MPS-04 – Generate crop maps UC-AGA-01 – Discovery, access, usage and uptake of Gross Primary Production data product

Researchers undertake a scientific procedure (hereafter referred to as *experiment*) to make a discovery, test a hypothesis, or demonstrate a known fact. The experiments undertaken by Earth Science researchers are usually aimed to produce useful and actionable information (*value added products* or other results) by transformation of satellite, in-situ or other data (hereafter called *input data*), through their elaboration on the basis of a defined "model", i.e. a mathematical algorithm, whose validity is often tested with the experiment itself.

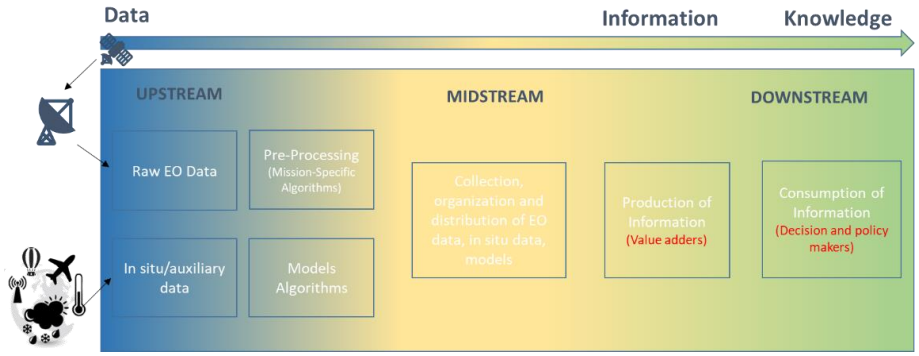

Figure 2: Data value chain

In other words, Earth scientists act as *producers of information* in the data value chain (Figure 2) from data to knowledge[1]. In doing so, they follow a process, encounter issues, solve problems, document procedures, with the aim to provide actionable information to those who will consume it to perform their activities, such as decision and policy makers.

The process of knowledge acquisition is often cumbersome, costly and time consuming. Preservation of it shall be done in a way that it can benefit other scientists, ensuring well-

[1] Data value chain is defined as an information flow that describes a series of steps required to generate value and useful insights from data (European Commission, 2014), (Curry, 2016). To fully realize the value chain of EO data, the Data-Information-Knowledge-Wisdom (DIKW) paradigm can facilitate evidence-based decision-making processes and informs about the limits of our planet (Ackoff, 1999), (Rowley, 2007). In DIKW, *data* is considered as a collection of facts/measurements in a raw or unorganized form (e.g., numbers); *information* is an *added-value product* generated from data that has been cleaned of errors and further processed in a form that makes it easier to visualize, analyze and interpret for a specific purpose (e.g., relation with physical and/or social phenomena). In turn, *knowledge* is generated when information is not only perceived as a description of collected and organized facts (e.g., contextualization), but also when one understands how to apply it to achieve certain objectives (i.e., elaborating valuable patterns). Finally, *wisdom* is when knowledge is applied to action to explore future scenarios and answer question such as "what is the best" or "why do something" (Ackoff, 1999), (Rowley, 2007).

structuredness and accessibility. Scientists shall be enabled to easily *reproduce*, *replicate* or *reuse*[2] previously performed experiments.

Table 1 describes, from S7 to S10, four typical scenarios of increasing complexity: S7 and S8 can be typically carried out by an Earth Scientist, while S9 and S10, more complex, might require in addition the expertise of a decision maker representative.

[2] The terms reproducibility, replicability and reusability (or generalizability) are used in the sense defined by the *National Science Foundation's Subcommittee on Replicability and Science (2015):*

- **Reproducibility** refers to the ability of a researcher to duplicate the results of a prior study using the *same materials and procedures* as were used by the original investigator.
- **Replicability** refers to the ability of a researcher to *duplicate* the results of a prior study if the *same procedures* are followed but *new data* are collected.
- **Generalizability** (**reusability or reuse**) refers to whether the results of a study apply in *other contexts or populations* that differ from the original one.

In short, *reproducibility* involves the original data and code; *replicability* involves new data collection(s) to test for consistency with previous results of a similar study; *reusability* (*reuse* for short) involves the original code (or a slightly modified version) with data for a different region of study, to aim to obtain similar results.

5. System required capabilities

The above-described scenarios pose many challenges including the need for users to **discover**, **access and use** heterogeneous *resources*, along with relationships and dependencies between each other, as well as the need for resource providers to "**provide**", i.e. expose to the interested audience, resources for easily sharing.

The mentioned *resources*, might be *Data* (satellite, in situ, airborne, etc.), *Services*, e.g. software applications (processing services) implementing a "model" used in an experiment; *Information* such as experiment results, value added products, and also websites, publications, etc., and all the concerning metadata.

These resources need to be linkable through well-defined *relationships*: e.g. when users find an experiment result, they shall be enabled to easily gain details regarding how the experiment was originally set-up, references to the *Service* (or details regarding the model) and the *Data* used, with identification of all the steps (recipe). These relationships are essential for supporting *knowledge* acquisition.

Discovery refers to the capability for the user to search for resources of interest based on defined criteria and find them; It involves an **inspection** capability for users to browse through a list of resources (typically the outcome of a search), analyse the metadata (which might include feedback directly provided by other users), visualize them on a map, etc. It also involves a **selection** capability to choose one or more particular resources, as a consequence of inspection.

Access refers to the capability for users or user applications to reach the resource of interest for use in the analysis. This might include their visualization (on a map, in case of georeferenced resources) and might include a download, depending on the type of resource and on the intended use.

Use refers to the exploitation of the accessed resource for the user's purpose. This might be the execution of a computation that, according to a given model or algorithm, implemented by a Service, transforms the input data into value added products.

The following sections provide detailed descriptions of the system required capabilities (SR – System Requirements) for which, the following definitions apply:

- 'Shall': Requirements containing 'shall' are considered essential, i.e. mandatory;
- 'Should': These are strongly recommended requirements although non-mandatory;
- 'Could': These are nice-to-have requirement (time and resources permitting), but the solution will still be accepted if the functionality is not included;
- 'Will': this can be used in a requirement text to provide additional information such as background or rationale, to help understand the requirement genesis and meaning. Will statements are not subject to verification.

Each requirement has the following attributes:

- 'Identifier': Symbolic identifier following the convention:
  SR-< Requirement Type>-<Counter> where <Requirement Type> refers to one of the different kinds of requirements, i.e. Functional (FUN), Interface (INT), Non Functional (NFC), Security, Privacy and Access Control (SEC); <Counter> is a requirements counter that uniquely identifies the requirement.
- 'Title': a very concise textual description of the requirement;
- 'Requirement Description': This is the formulation of the requirement. Each requirement attempts to be clear, concise and unambiguous, with each statement containing one and only one requirement;
- 'Source scenarios': indicating the associated generic scenarios described in Table 1

- ‘Linked User Requirements’: the user requirements (described in [RD-3] GPP-DEL-WP2-D2.5-v1.0 Use Cases Description and User Requirements Document v3) that need to be satisfied with this system requirement; they are identified in this document here by code and title, please refer to D2.5 [RD-3]for full text description.
- ‘Acceptance Criteria’: describing the constraints for which a requirement is valid
- ‘Priority’: This can be High, Medium or Low. High priority means early delivery needed, low means late delivery acceptable. They reflect the importance and urgency given to each requirement.
- ‘Stability’: this allows flagging requirements which are unstable, i.e. which are still under discussion and as such might change.
- ‘Affected/Used GEOSS Platform Components’: this represents a preliminary allocation of the requirements to the GEOSS Platform Components that are expected to be mainly affected by the requirement.

3.1. SR-FUN-001 – Yellow Pages Management

Identifier
SR-FUN-001

Title
Registration to the GEOSS Yellow Pages and management

Requirement Description
Yellow Page is a catalogue of data providers on the GEOSS Platform. The potential new data provider can access the registration mode by clicking on a graphic banner, which transfers him to a Yellow Page registration page. To submit a request to become a data provider, a representative must fill all required form fields and then accept the Terms and Conditions. After submission, the user receives two e-mail information:

- Thank-you information with a link for checking the status of the registration process sent immediately after the submission;
- Status of the account, sent after the acceptance and becoming an active data provider or a rejection by GEO Bodies.

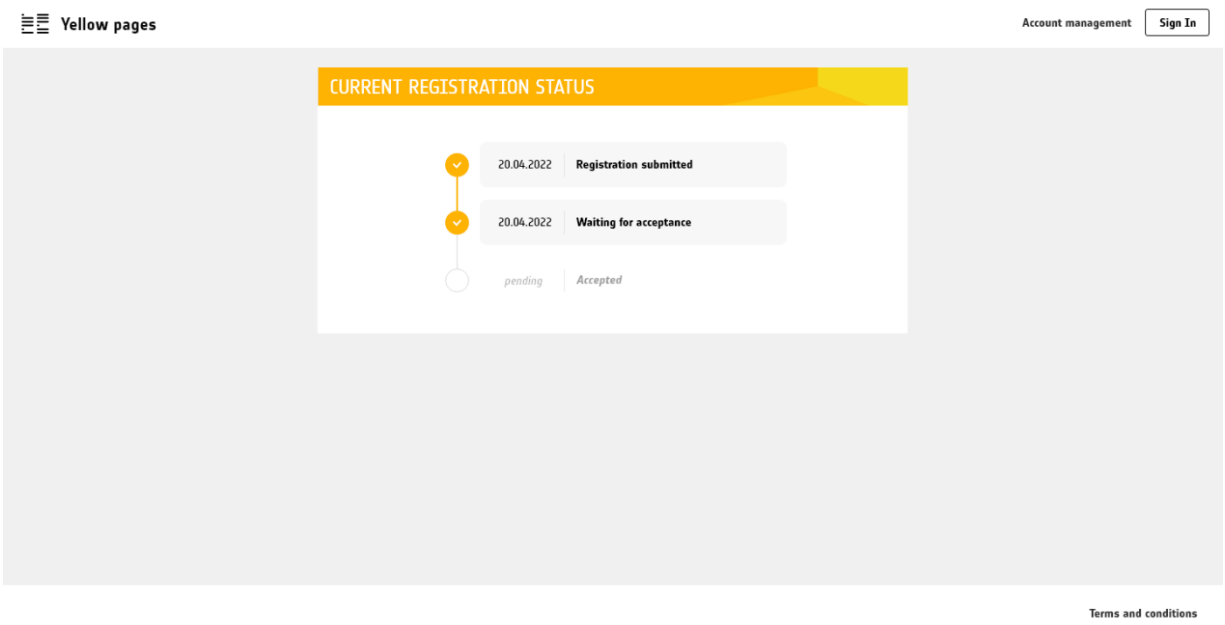

Figure 3. Yellow Pages registration status view

After registration and acceptance of the potential data provider application, an account is created within the Yellow Pages system based on data provided within the registration form. The data provider can log in to the account via the Yellow Pages site. Within the view (after logging in) Data provider will be able to modify data provided during registration in the "Account management" module. Any changes done to the data by Data Provider should be accepted via workflow by the Yellow Pages administrator except for the password or mail address change.

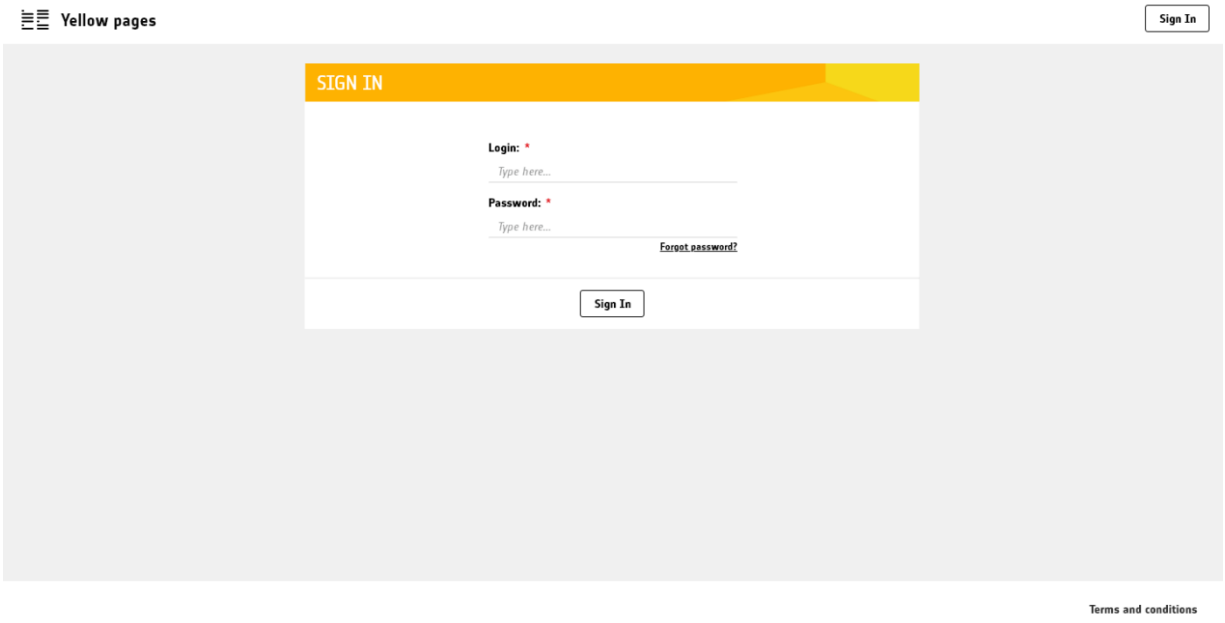

Figure 4. Sign in view

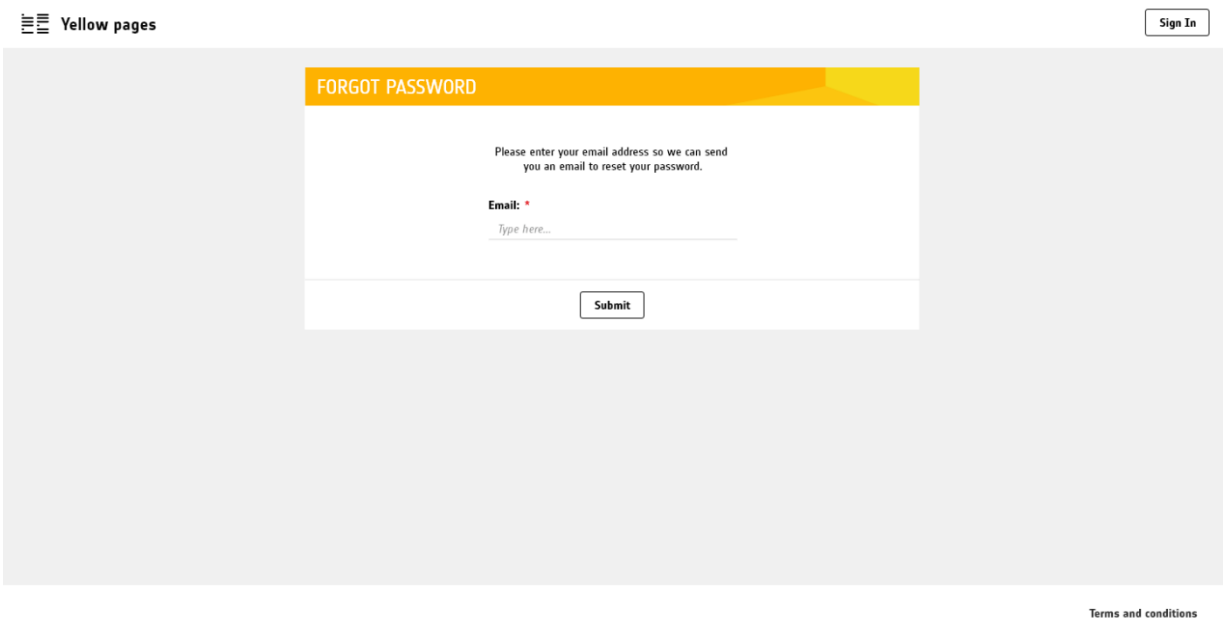

Figure 5. Forgot password view

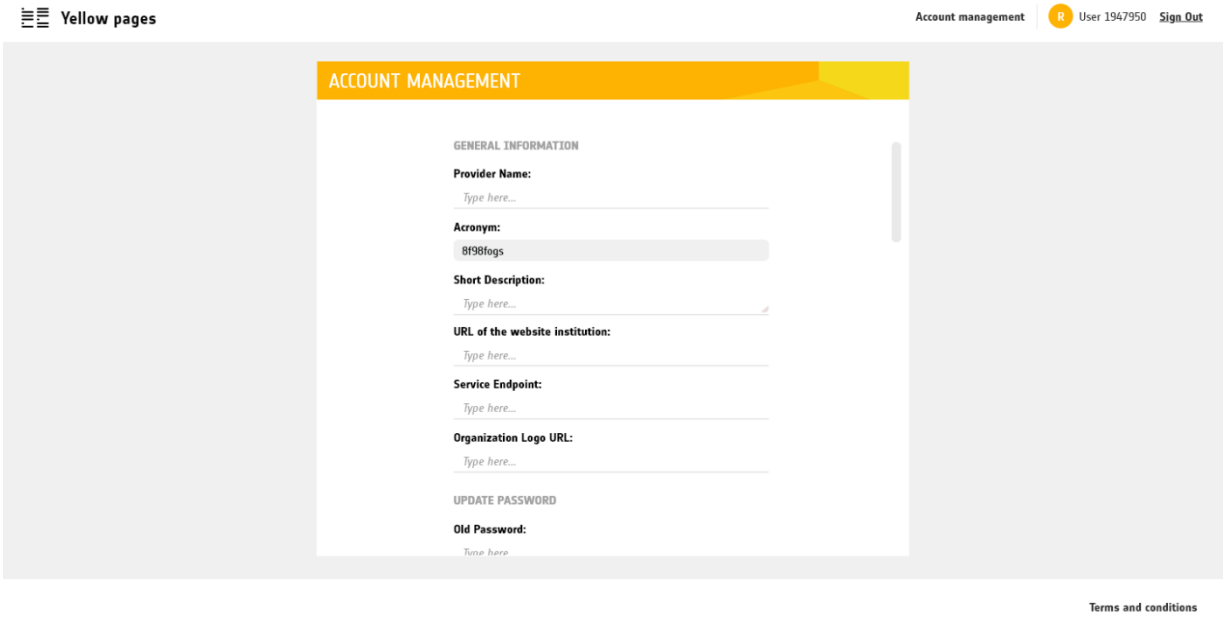

Figure 6. Account management for Data Provider view 1

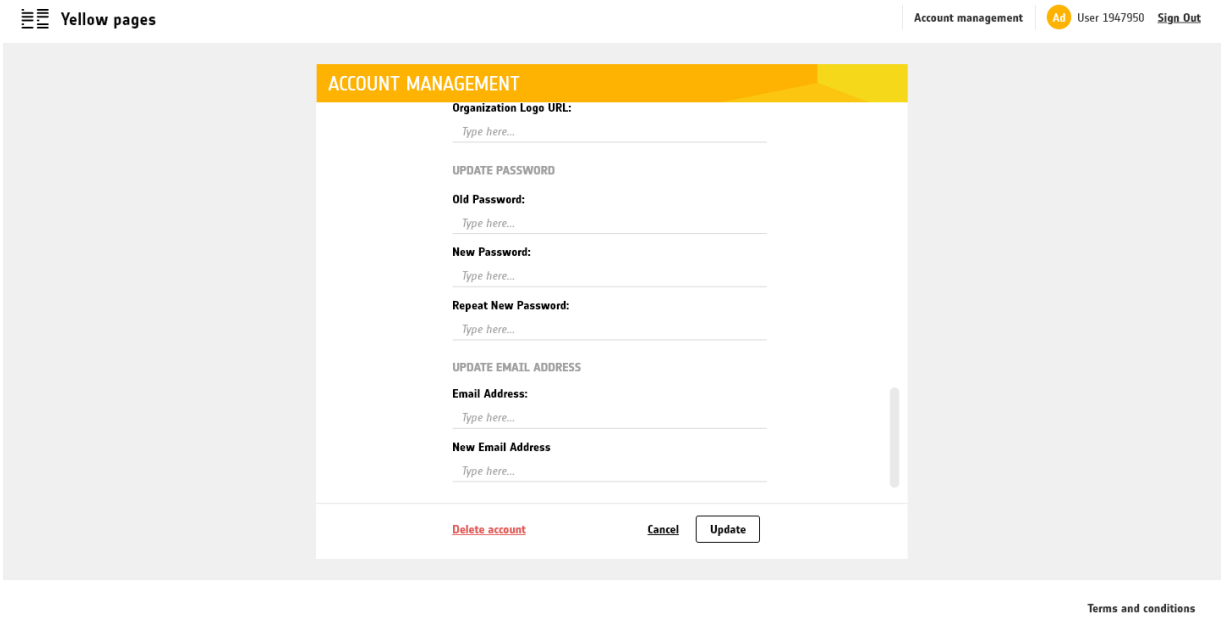

Figure 7. Account management for Data Provider view 2

The Yellow Pages owner receives an installation package, and all necessary information to deploy on their premises finished Yellow Page's solution.
Within the system, there will be three roles: data provider, acceptance body, and administrator. Data providers will be able to manage their accounts after logging in. It will be possible for them to change the data they have provided within the registration form. Changes that will be provided will need to be accepted by the Administrator except for changes regarding password or mail address. The data providers will also be able to delete the account, which will result in the removal of all the data present in the system (GDPR).
The Administrator of the system can create an acceptance body account or another administrator account. To make such an account following data will be needed: First Name, Last Name, Mail Address, and Password. Users with the Administrator role take part in process of acceptance of new data providers via the registration status module and can remove other users from the system. Lastly, Administrators can modify the current registration form (remove/add new fields).
Users with acceptance body roles can modify account details just like in the case of the Data provider or Administrator role and additionally are granted access to the registration status module. Within this dashboard, Users can accept or reject registration applications. Firstly, the system administrator does the acceptance, and then the decision is passed to the Users with the acceptance body role.

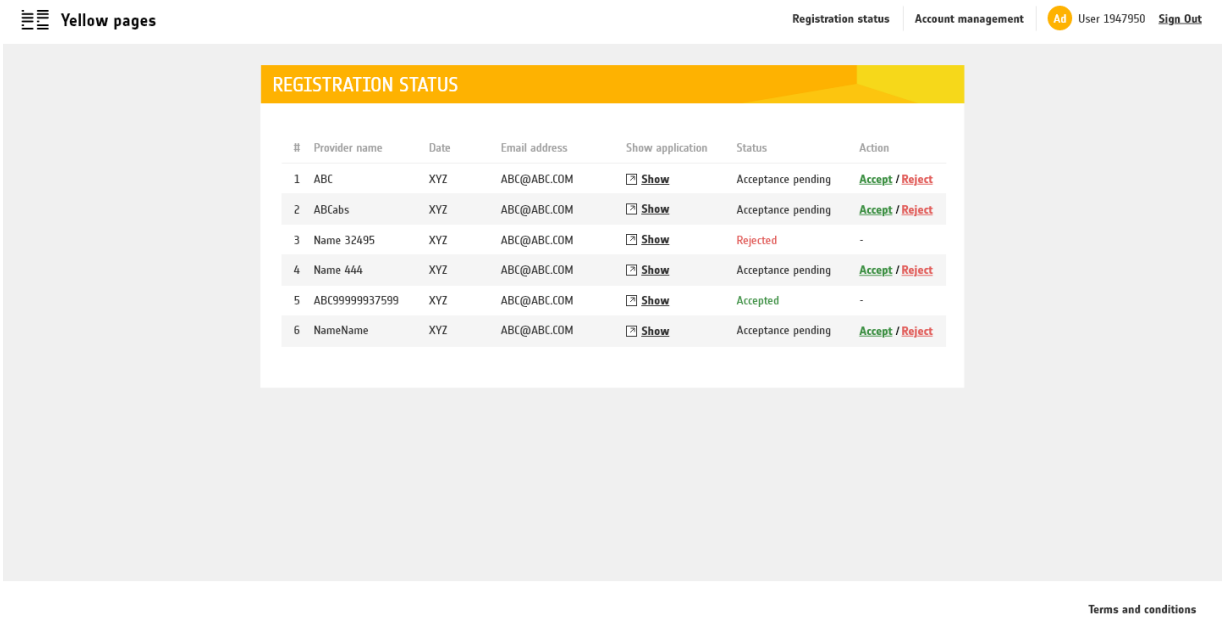

Figure 8. Registration status management by Administrator or Acceptance role's view.

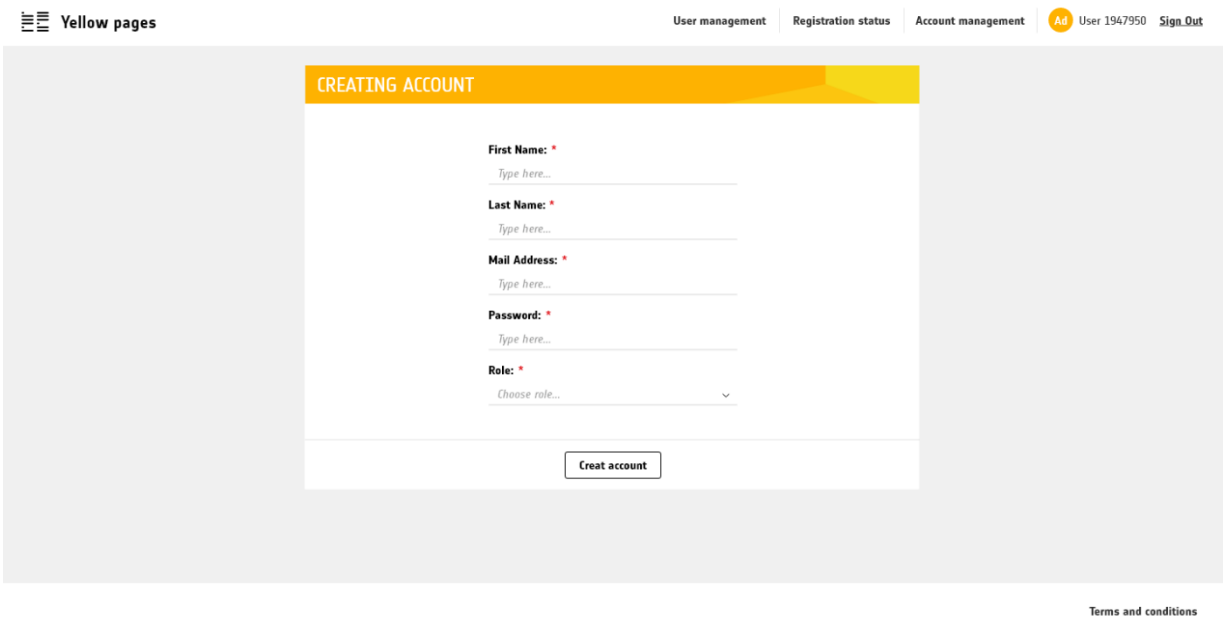

Figure 9. Account creation for Administrator view

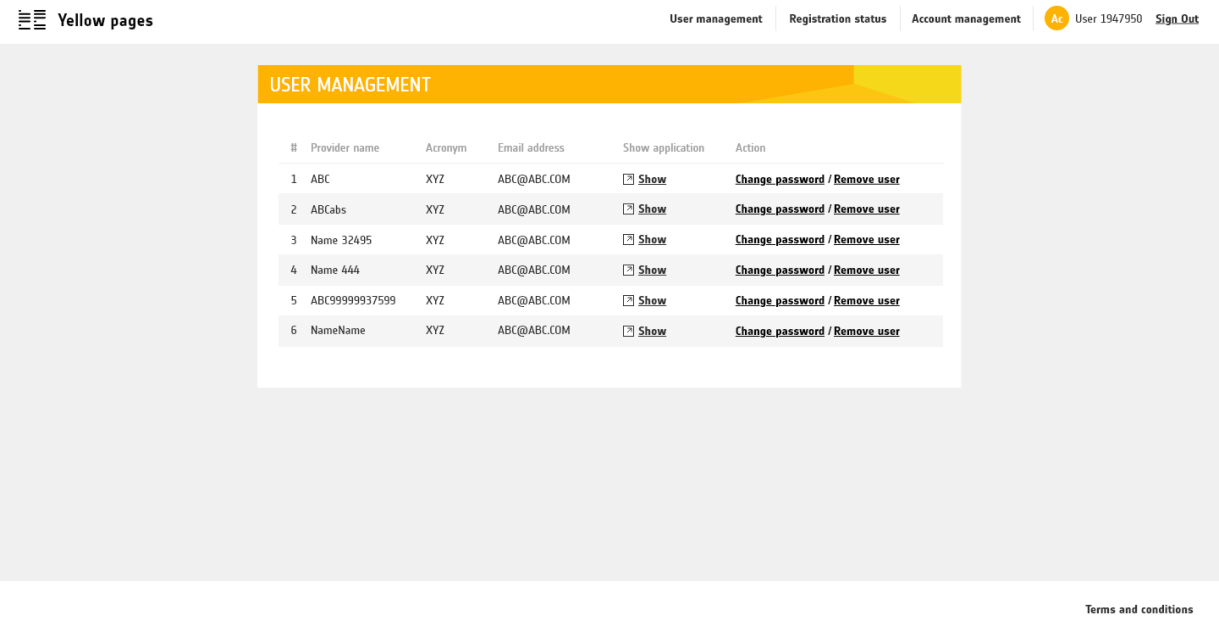

Figure 10. User Management view for Administrator

Source scenarios

S5 Data providers (registration)

Linked User Requirements

- UR-YPG-01- Graphic Banner
- UR-YPG-02- Wizard Registration
- UR-YPG-03- Terms of Service Acceptance
- UR-YPG-04- User Notifications
- UR-YPG-05- Data Modification\Deletion
- UR-YPG-06 – Data Provider Account Request
- UR-YPG-07- Search and Visualization of Registered Data Providers
- UR-YPG-08- Widget download
- UR-YPG-09- Widget Installation
- UR-YPG-10 – Yellow Pages Authorization
- UR-YPG-11 – Yellow Pages Authorization Response
- UR-YPG-12 – Data Modification
- UR-YPG-13 – Data Provider Account Management
- UR-YPG-14 – Data Provider Registration Process Status

Acceptance Criteria:

UR-YPG-01- Graphic Banner:

- A package of graphic banners in different ratios is delivered. They can be used as a link to the registration form.
- Banners are delivered in a format enabling image scaling

UR-YPG-02- Wizard Registration, UR-YPG-03- Terms of Service Acceptance, UR-YPG-04- User Notifications, UR-YPG-05- Data Modification\Deletion, UR-YPG-06 – Data Provider Account Request:

- An in-page registration form is delivered. It contains different field types:

- short answers to questions,
- radio buttons,
- multiple-choice questions.

- The registration form contains the following fields (marked with "*" are mandatory):
  1. Provider name *
  2. Acronym - Please specify your acronym
  3. Short description * - Summary of provider objectives and goals
  4. URL of the website institution
  5. Geographical coverage of the organisation * - Choose as many as you like
  a. Global
  b. Regional
  c. National
  d. Local
  e. Other:
  6. If you have selected "National" and "Regional" in the previous question, please give the names of countries and/or regions
  7. GEO affiliation *
  a. Member
  b. Participating Organisation
  c. Observer
  d. Non GEO
  8. What is the name of the Official Focal point? *
  9. What is the email of the Official Focal point? *
  10. What is the name of the Technical focal point? *
  11. What is the email of the Technical focal point? *
  12. Type of online resource? *
  a. Data (including imagery)
  b. Knowledge body
  13. Type of Knowledge Body - If your online resource is a Knowledge Body, which type is it?
  14. Data accessibility * - Is your data accessible?
  a. Yes - without restrictions
  b. Yes - with login/credentials
  c. No - but metadata available
  15. Data policy * - The GEOSS Data Collection of Open Resources for Everyone (Data Core) is a distributed pool of documented datasets with full and open unrestricted access at no more than the cost of reproduction and distribution. More information: https://www.earthobservations.org/geoss_dsp.shtml
  16. GEOSS Data Core
  a. Restricted
  b. Other:
  17. GEOSS Data Management Principles label
  a. This is a self-assessment done by the data provider
  b. Discoverable - http://geolabel.info/Discoverable.htm
  c. Accessible - http://geolabel.info/DataAccess.htm
  d. Standard encoding using - http://www.geolabel.info/Encoding.htm
  e. Well documented metadata- http://geolabel.info/Metadata.htm

f. Traceable - http://geolabel.info/Provenance.htm
g. Quality documented - http://geolabel.info/Quality.htm
h. Preserved - http://geolabel.info/Preservation.htm
i. Periodically verified - http://geolabel.info/Verified.htm
j. Reviewed and refreshed - http://geolabel.info/Processing.htm
k. Tagged with permanent ID - http://geolabel.info/Identifier.htmhttp://geolabel.info/Identifier.htm

18. Relevant SBA
a. Biodiversity and Ecosystem Sustainability - http://earthobservations.org/area.php?a=bes
b. Disaster Resilience - http://earthobservations.org/area.php?a=dr
c. Energy and Mineral Resource Management - http://earthobservations.org/area.php?a=emrm
d. Food Security and Sustainable Agriculture - http://earthobservations.org/area.php?a=fssa
e. Infrastructure and Transportation Management - http://earthobservations.org/area.php?a=itm
f. Public Health Surveillance - http://earthobservations.org/area.php?a=phs
g. Sustainable Urban Development - http://earthobservations.org/area.php?a=sud
h. Water Resources Management - http://earthobservations.org/area.php?a=wrmhttp://earthobservations.org/area.php?a=wrm

19. Relevant SDG - Please choose one or more Sustainable Development Goals (SDG)
a. Goal 1: No Poverty
b. Goal 2: Zero Hunger
c. Goal 3: Good Health and Well-being
d. Goal 4: Quality Education
e. Goal 5: Gender Equality
f. Goal 6: Clean Water and Sanitation
g. Goal 7: Affordable and Clean Energy
h. Goal 8: Decent Work and Economic Growth
i. Goal 9: Industry, Innovation and Infrastructure
j. Goal 10: Reduced Inequalities
k. Goal 11: Sustainable Cities and Communities
l. Goal 12: Responsible Consumption and Production
m. Goal 13: Climate Action
n. Goal 14: Life Below Water
o. Goal 15: Life on Land
p. Goal 16: Peace, Justice and Strong Institutions
q. Goal 17: Partnerships for the Goals

20. Other initiative
21. Service endpoint *
22. Organization Logo URL *
23. E-mail address *
24. Password *

- It contains the same fields and field types as the current one based on GoogleDocs. Additionally, it contains fields with e-mail and password, a checkbox of Terms of Service acceptation and CAPTCHA verification.
- If the user tries to send a request without filling any obligatory field, without accepting Terms of Service or with wrong format of email/password, the page reloads, and missing fields are marked in red with the description what was wrong.
- After submitting a registration form, the user receives an e-mail with a request for confirmation of a sign-up as well as the information about their pending registration. The user gets another notification after their registration is accepted.

UR-YPG-05- Data Modification\Deletion, UR-YPG-13 – Data Provider Account Management:

- After the acceptance of registration and the creation of an account, the logged in User can see the link "Account management" after entering Yellow Page site. After clicking, they can see a tab with editable answers to the questions. They can edit every value and approve the new version of the form by clicking on the button at the bottom.
- In case of an e-mail or password change, the user receives a confirmation e-mail.
- The user can delete their account using the button in their profile's management settings saying, "Delete account". After pressing the button, they can see a pop-up informing them about all data to be lost and asking for a confirmation. After clicking, they are logged out of YP.
- System should have a recovery password option, which triggers a mail sent to the mail address provided by the User.

UR-YPG-07- Search and Visualization of Registered Data Providers:

- The current functionality (which can be found on https://www.geoportal.org/community/guest/yellow-pages) is used.
- After the new provider's registration is accepted and their profile is added to Yellow Pages, information about this organization are displayed on the list.

UR-YPG-08- Widget download, UR-YPG-09- Widget Installation:

- The Yellow Pages owner receives a complete installation package ready along with the manual of the installation

UR-YPG-10 – Yellow Pages Authorization, UR-YPG-11 – Yellow Pages Authorization Response:

- Yellow Pages owner and GEO Bodies can open the pending registration list via "registration status" module. Within this module user can click on chosen application to see what data was provided within the form (except for the password).
- Yellow Page owner gets a notification about new registrations. At the end of the linked form, they can see two buttons: to pre-accept or reject the registration request. The "Pre-accept" button sends an e-mail to GEO Bodies with a link and a request for a review. The "Reject" button sends an appropriate decision e-mail to a user.
- GEO Bodies get a notification about pre-accepted registration requests. At the end of the linked form, they can see two buttons: to accept or reject the registration request. Both buttons send an appropriate decision e-mail to a user.

- Under the list of pending requests, there is a list of previous decisions, showing the provider's name, date of the request, date of the decision and the decision (approved or declined).
- Yellow Page's owner can remove user in case of validation of the Terms and Condition

UR-YPG-12 – Data Modification

- YP owners can open a link leading them to the editable content of the registration form, where they can easily add or delete questions or answers to choose from and change the order or type of the solution.
- After making the changes, they can approve the new version of the form by clicking on the button at the bottom of the state. The page redirects to a confirmation site or pop-up, where the editor can see the list of changes (listed in the table as before/after) and once again accept the changes.
- If a newly added question is mandatory, current users can see them along with a request for an answer after accessing "Account management".

UR-YPG-14 – Data Provider Registration Process Status

- In confirmation e-mail, the user receives a link with the text "Check the status of your registration".
- After clicking the link user can see the date and time of the following steps (if they already happened):
    - Submitted,
    - Waiting for the acceptance,
    - Accepted or Rejected,

Stability
Stable

Priority
High

Affected/Used GEOSS Platform Components
Yellow Pages, GEO DAB, GEOSS Portal

3.2. SR-FUN-002 – Community Portal

Identifier
SR-FUN-002

Title
Mirror Site

Requirement Description
The Community Portal is a section of the GEOSS Portal that enables communities to share specific and predefined data, articles, studies as a thematic area part of the GEOSS Portal, customized so relevant information is directly discoverable and accessible to the specific community.
The GEOSS Platform shall support the building of the stand-alone portal where they will have the possibility to later decide to publish it in the GEOSS Community Portal section.

Finally, the GEOSS Platform is open to add in its list in the GEOSS Community Portal section, any external Mirror Site, provided by communities that would like to promote and share their information with the GEO communities in agreement with the GEO Bodies.
The GEOSS Portal account is necessary to download an installation package for the community portal. users, that do not have an account must sign up prior to being able to access the download link. A logged in user accesses a link in the menu redirecting to a page which allows them to download the installation tool along with the installation manual to create the Mirror Site Portal on its premises.

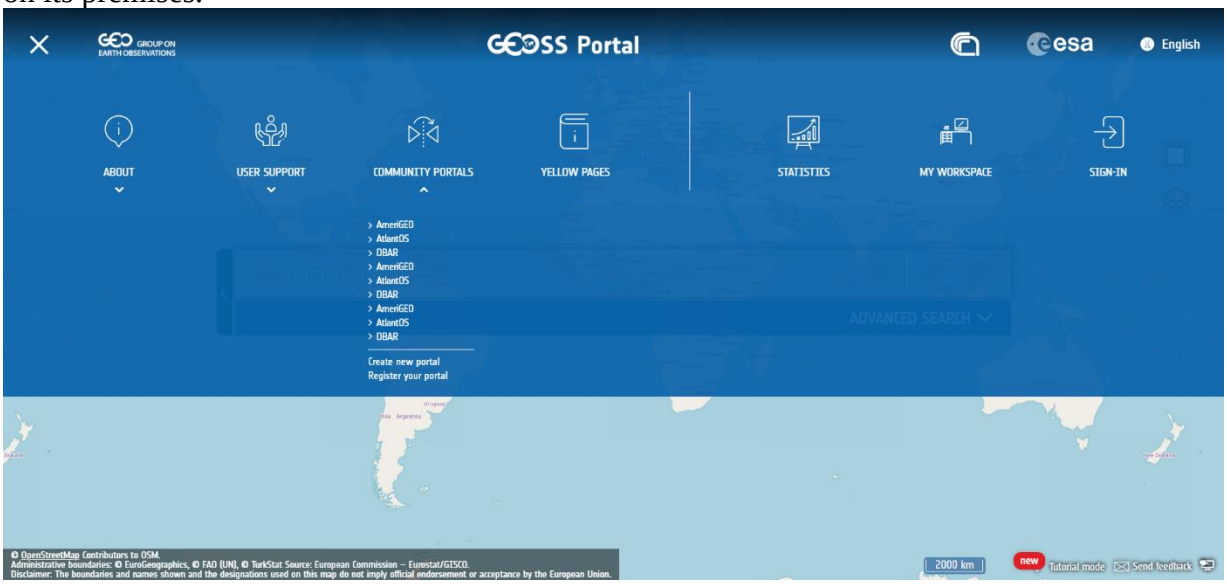

Figure 11. Menu for a logged user

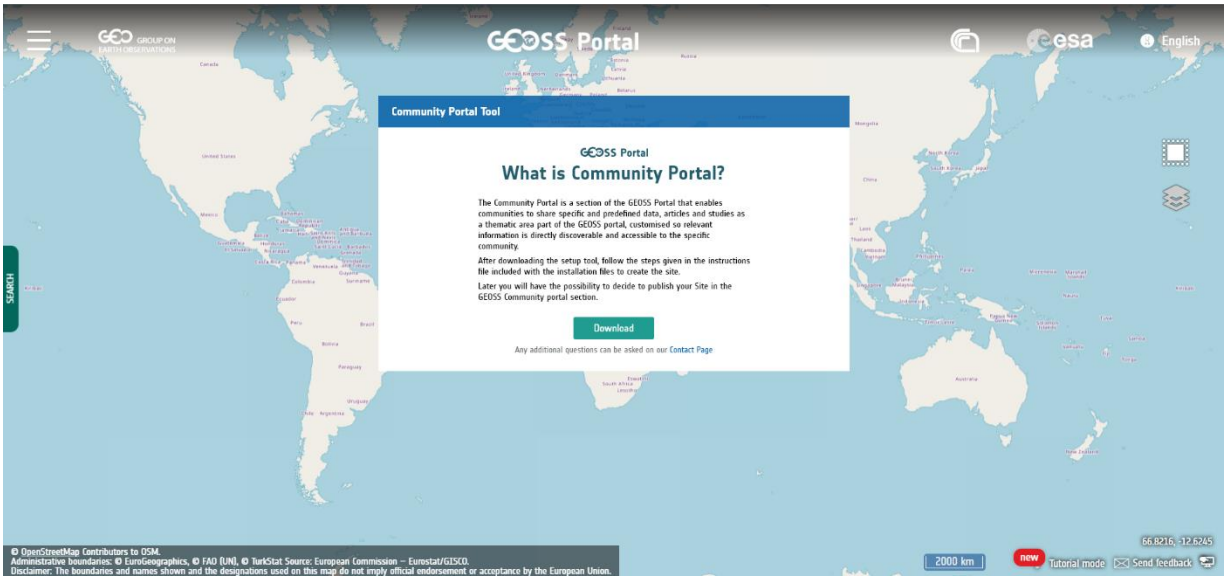

Figure 12. Downloading the configuration tool

When the tool is downloaded, the user can install it by themselves, start an obligatory Mirror Site account and start the configuration of their Mirror Site – add a logo and optionally customize the frontend using the code source. A Community Site owner by default is the Administrator regarding the installation files they have received. When the Site is configurated, the user can publish it on its premises. Additionally during the configuration of the Community Site, the downloaded tool shows the user the information about the possibility of choosing the view to which the site will be associated with. It is possible to reconfigure the site after using the same tool.

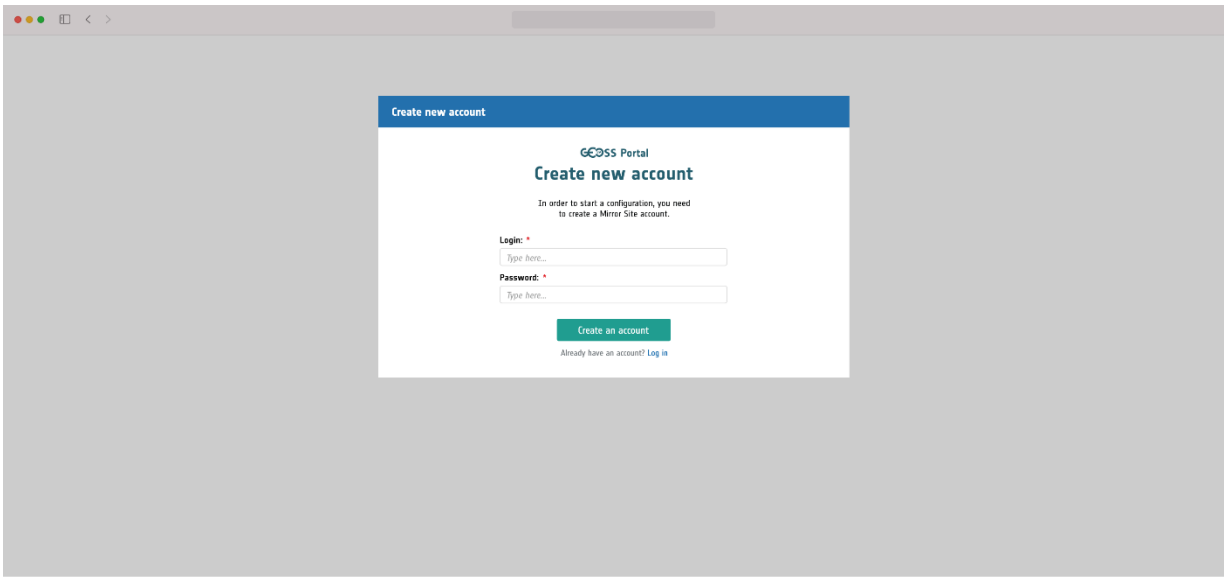

Figure 13. Account creation in tool

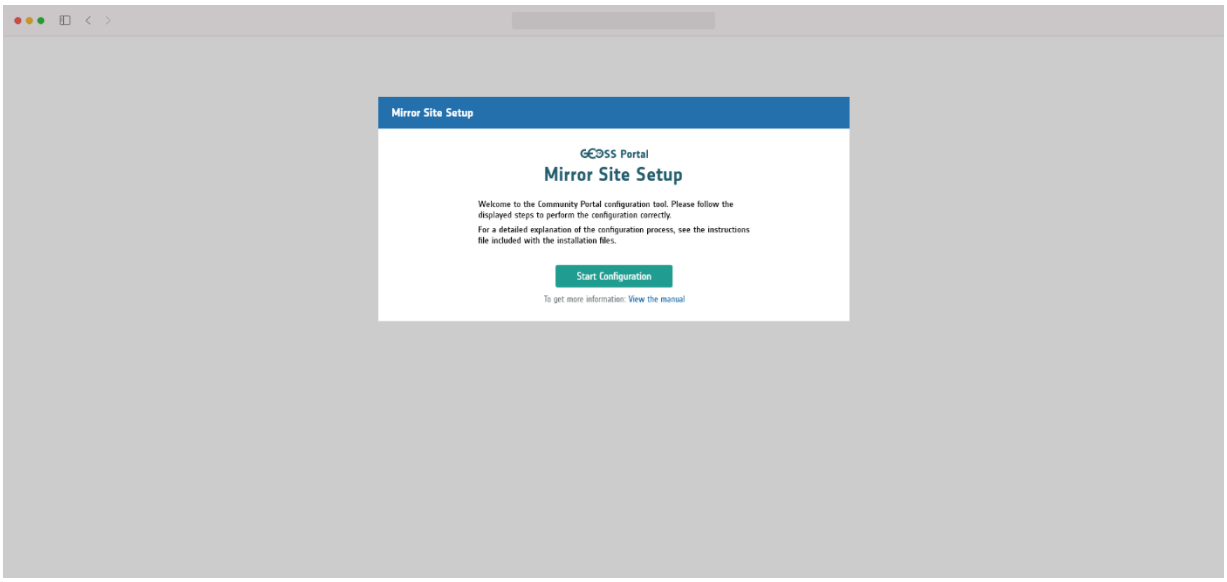

Figure 14. Starting the configuration

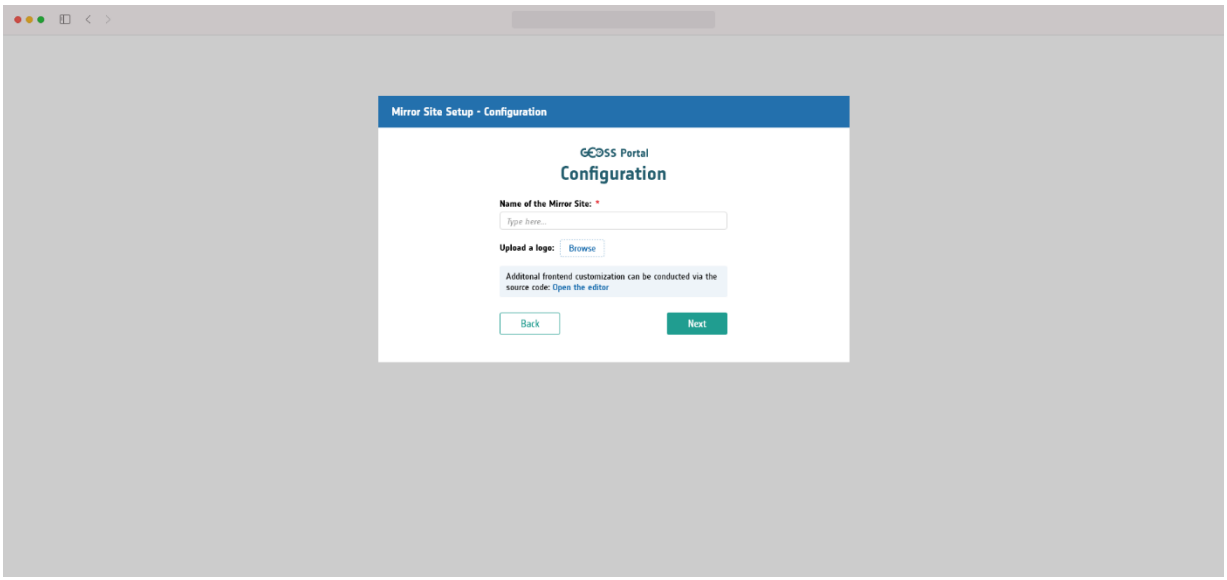

Figure 15. Configuration - Name, logo and source code

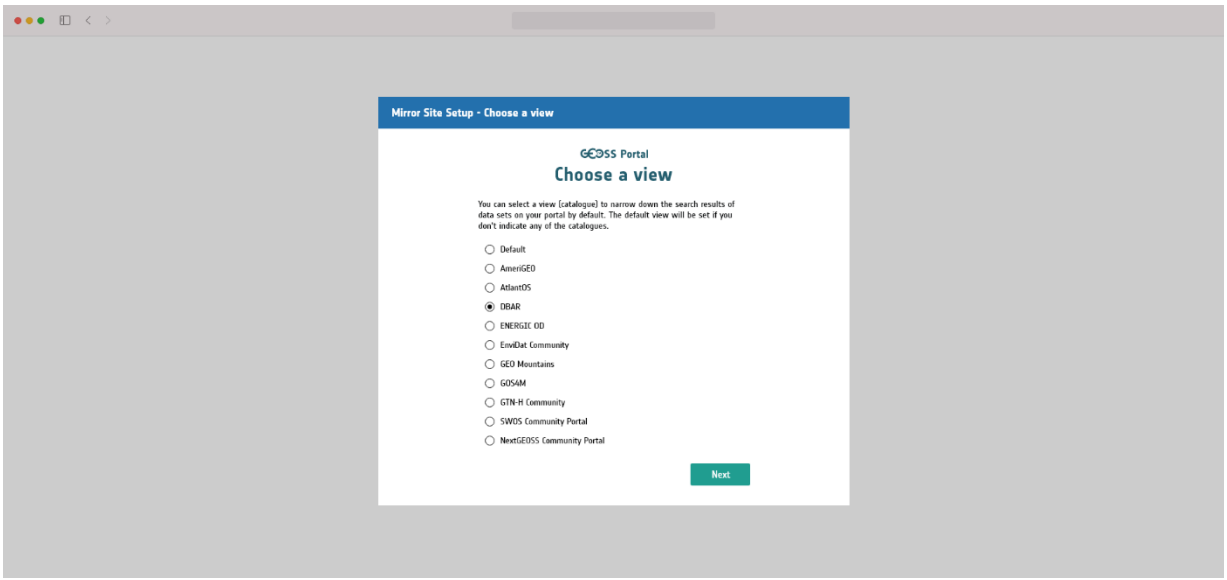

Figure 16. Choosing a view

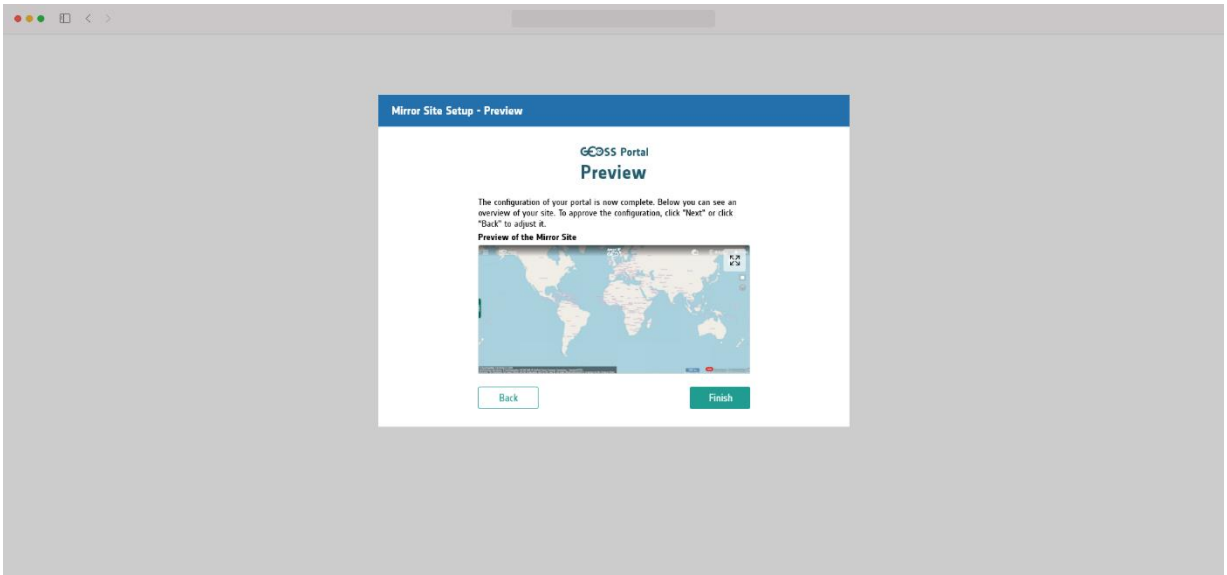

Figure 17. The preview after choosing a view

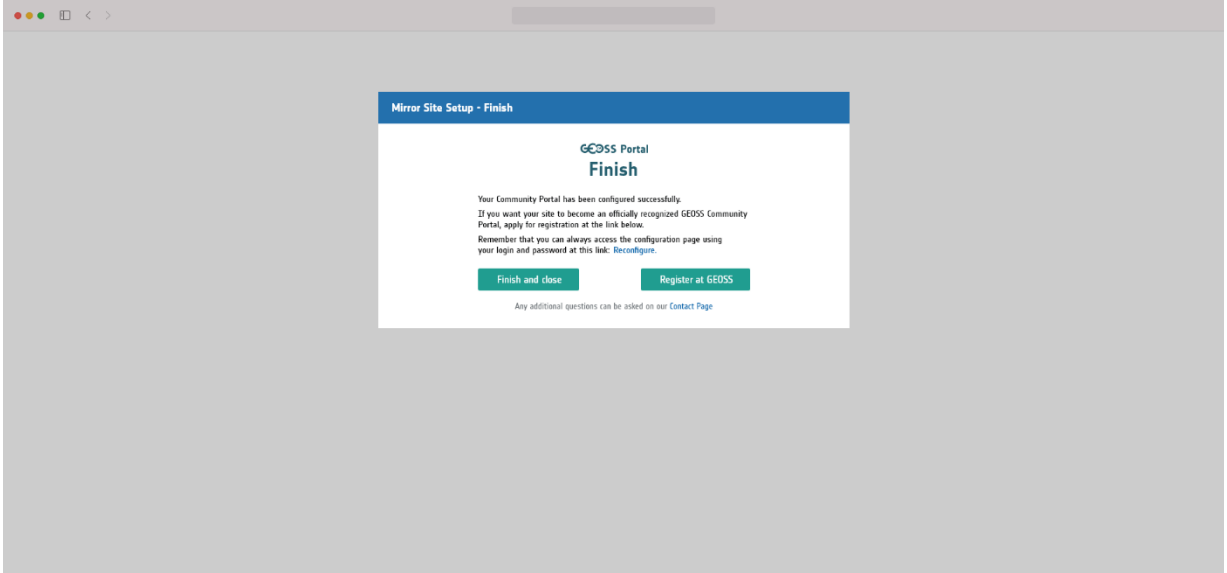

Figure 18. Finished configuration

Based on the user's needs it is also possible to request from a GEOSS Platform for the community site to become officially recognized by GEOSS Community Portal. To be able to do so the user must login into the GEOSS Portal. After logging in it is possible for a user to submit such a request. The user shall explain the purpose of the submission and provide a portal name along with the site's URL address. After completing the request form they can click the "Submit" button and if there are no errors with the content, their request is placed and sent for verification.

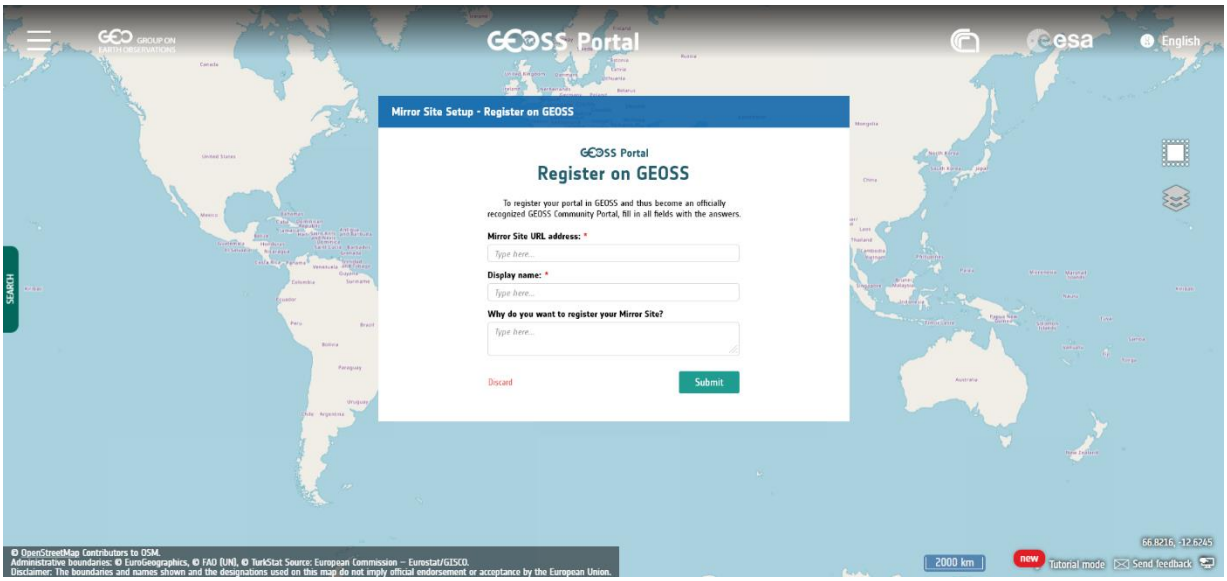

Figure 19. Submitting a request

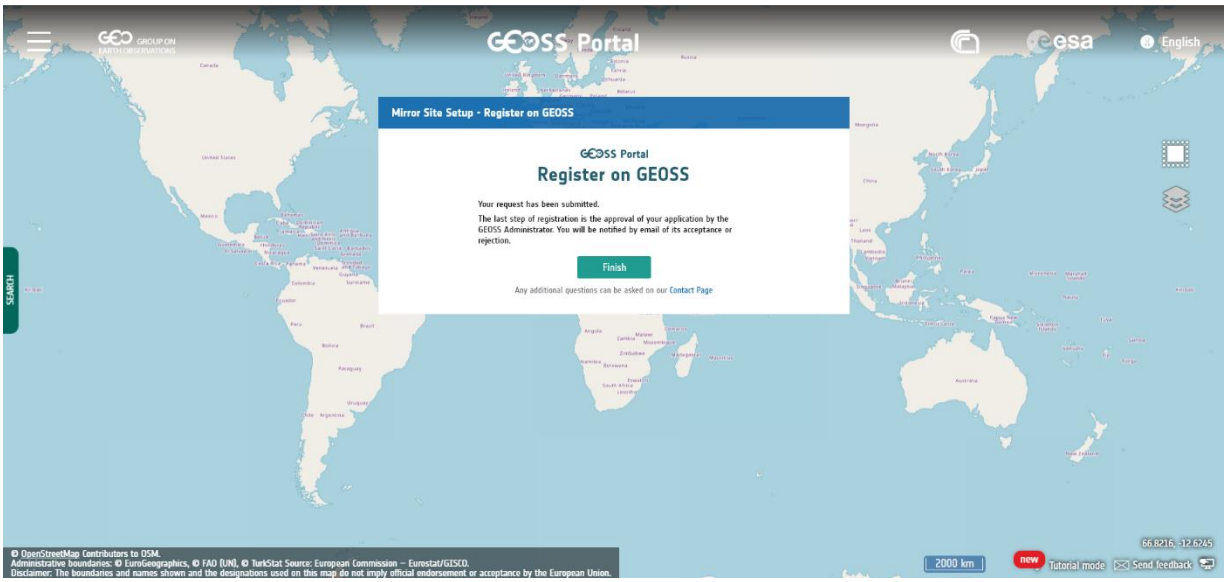

Figure 20. After submitting a request

When the user places a request for a link, the GEOSS Portal Administrator receives an email notification through which they can access the list of pending requests displaying data provided by the user. After clicking the link, the Administrator can either reject a request with the possibility of editing the answers, reject without the possibility of editing (both causing sending of an email to a request owner), or approve it, which sends it to the GEO Body having the same decision to make.

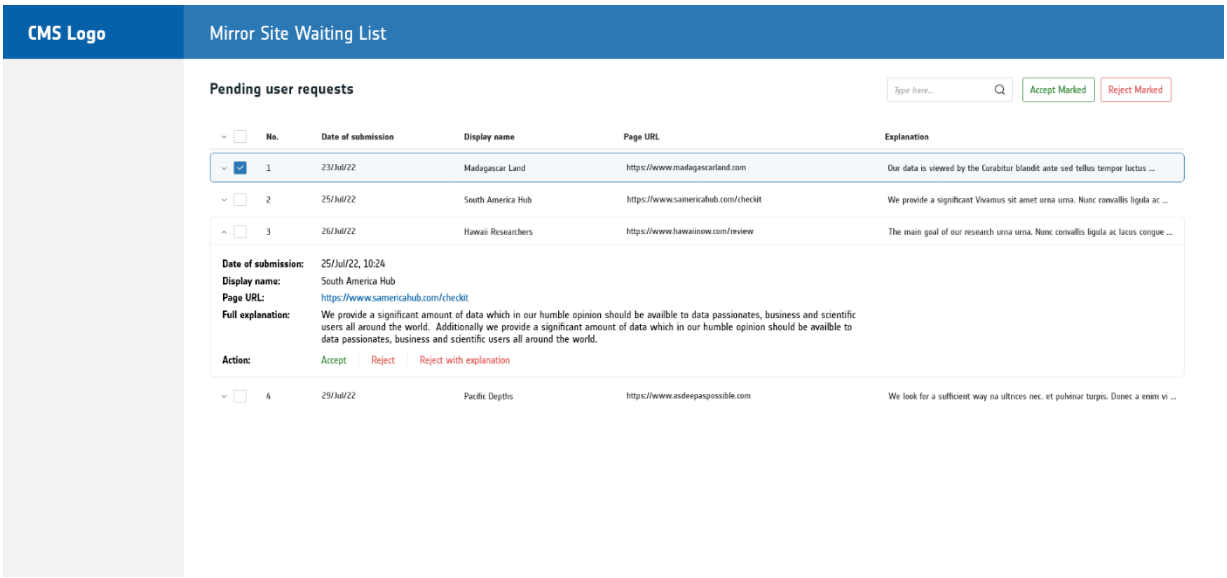

Figure 21. List of pending requests

If the GEO Body rejects a request, the request owner receives the same notification as after the Administrator's rejection. The Administrator and the GEO Body can explain the reason for the rejection which will be shown in an email sent to the User.
After the acceptance, the link is visible on the GEOSS Portal after the data migration and the user gets a success notification. If the Administrator or the GEO Body makes no decision, they get a reminder notification every 5 days after receiving the last application.
The Administrator can delete accepted links currently present on the list on the GEOSS Portal using the list of active links.

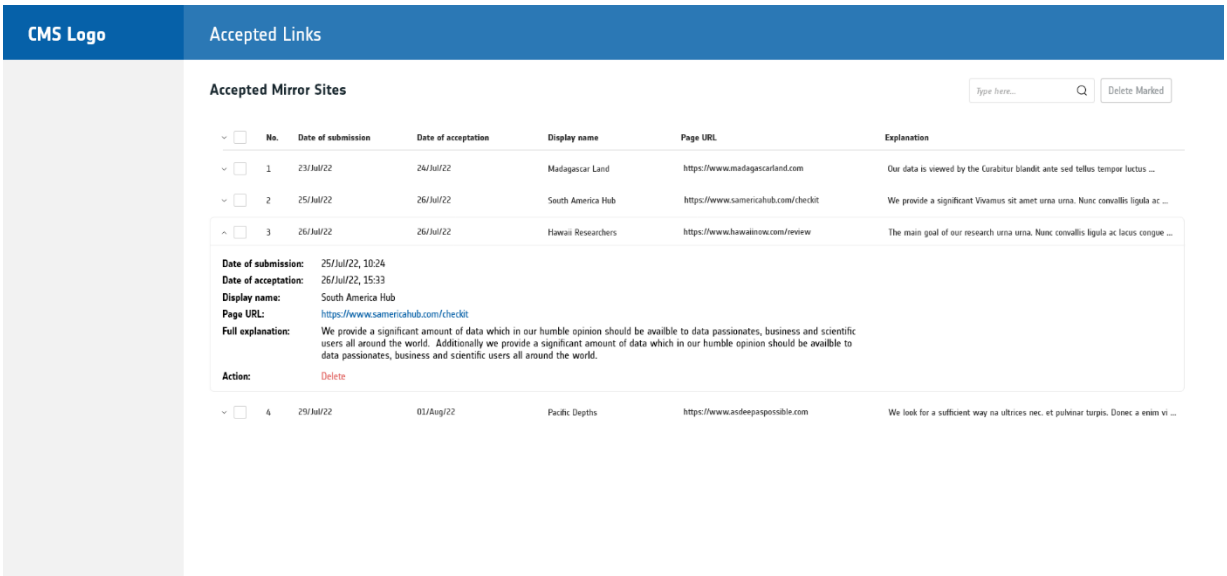

Figure 22. List of active links

Source scenarios

S1 Resources discovery and access with linked information
S6 Exploiting discovery and access capabilities

Linked User Requirements

- UR-CSP-01 – Community Portal package access

- UR-CSP-02 – Community Portal General Configuration
- UR-CSP-03 – Views Selection
- UR-CSP- 04 - Views Setup
- UR-CSP-05 - Link to the Community Portal from GEOSS
- UR-CSP-06 – Community Portal information
- UR-CSP-07 – Administration rights
- UR-CSP-08 – Add Community Portal in the Community Portal Section

Acceptance Criteria:

UR-CSP-01 – Community Portal package access

- Users must log in to be able to access the page with download link.
- Users who do not have an account on the GEOSS Portal have to be able to sign up and activate the account. Upon logging in afterwards the page with download link for the tool is accessible.
- An installation package contains files necessary to run the tool and a manual explaining how to install the tool and configure a Mirror Site.

UR-CSP-02 – Community Portal General Configuration

- After downloading of the tool, the user can install it by themselves, create an obligatory Mirror Site account and start the configuration of their Mirror Site.
- With the installed tool, the user can open it, add a logo and optionally customize the frontend using the source code.
- A Community Site owner by default has the role of an Administrator regarding the installation files they have received. No outside help is required to publish a Site.
- When the Mirror Site is configurated, the user can publish it on its premises.

UR-CSP-03 – Views Selection,
UR-CSP-04 - Views Setup

- While working on configuration of the Community Site the tool allows the user to choose the view from predefined list, which should be used on the site.

UR-CSP-05 - Link to the Community Portal from GEOSS,
UR-CSP-06 – Community Portal information

- After entering the page from link a mail:
    - A not logged user sees a “Log in” pop-up. After successfully logging in they can see a “Create a request” button, which opens a new request for linking a Community Portal on the GEOSS Platform. If the login fails, they cannot move on to a request creation.
    - A logged user sees a “Create a request” button, which opens a new request for linking a Community Portal on the GEOSS Platform.
- After opening a new request, the user sees a form in which they have to fill in:
    - the purpose of the submission;
    - the site’s URL address;
    - portal name to be displayed as a link.
- After filling in all required information fields, the user clicks on a “Submit” button.
- If all data is correct, the user sees a confirmation message displayed on the page thanking for the request and informing about the next step – the acceptance, after which the user will receive an email. The request is sent.

- If there is something wrong with the data e.g., some field hasn't been filled, the page refreshes and marks found errors, enabling making changes before clicking "Submit" again.

UR-CSP-07 – Administration rights

- By default the user, that downloads the package with installation tool is set to be an administrator.

UR-CSP-08 – Add Community Portal in the Community Portal Section

- When the user places a request for a link, the GEOSS Portal Administrator receives an email notification through which they can access the list of pending requests displaying data provided by the user.
- On the review page the Administrator can see three buttons causing:
    - Rejection of the request allowing the changes – the user receives an email informing about the rejection and can again send a link with corrected data,
    - Rejection of the request without allowing the changes – the user receives an email informing about the rejection and can't change the decision,
    - Acceptance of the request – the request is sent to the GEO Body for the acceptation.
- The GEO Body receives an email notification, through which they can access the list of pending requests displaying data provided for a link by the user.
- On the review page the GEO Body can see three buttons causing:
    - Rejection of the request allowing the changes – the user receives an email informing about the rejection and can again send a link with corrected data,
    - Rejection of the request without allowing the changes – the user receives an email informing about the rejection and can't change the decision,
    - Acceptance of the request – the link is visible on the GEOSS Portal after data migration and the user gets a success notification.
- The Administrator and the GEO Body can explain the reason for the rejection which will be shown in an email.
- If the Administrator or the GEO Body makes no decision, they get a reminder notification every 5 days after receiving the last application.
- The Administrator can delete accepted links currently present on the list on the GEOSS Portal using the list of active links.

Priority
High

Stability
Stable

Affected/Used GEOSS Platform Components
GEO DAB, GEOSS Portal

3.3. SR-FUN-003 – SDG - 15.3.1 Dashboard

Identifier
SR-FUN-003

Title
SDG - 15.3.1 Dashboard

Requirement Description
The SDG 15.3.1 is an indicator whose objectives include the dissemination of knowledge on land degradation. The GEOSS Portal enables the user to independently start the computation of chosen resources in terms of land degradation and visualize the outcome in various forms.
After typing “Land degradation” in the GEOSS Portal search engine, the user receives a number of results connected to the topic. They can switch between the Information, Services and Data tabs as well as apply different types of filters. Choosing the Services tab reveals to the user the resource named “SDG 15.3.1 – European model service “, which enables the computation in the topic of land degradation.

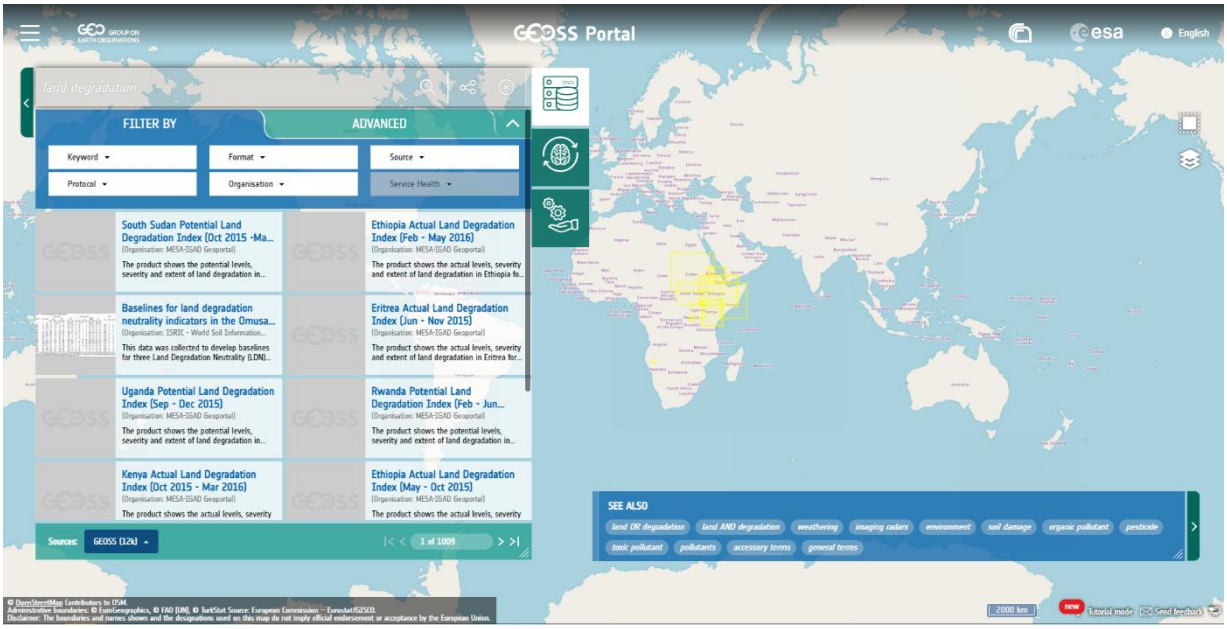

Figure 23. Land degradation search results

Figure 24. Services tab of search results

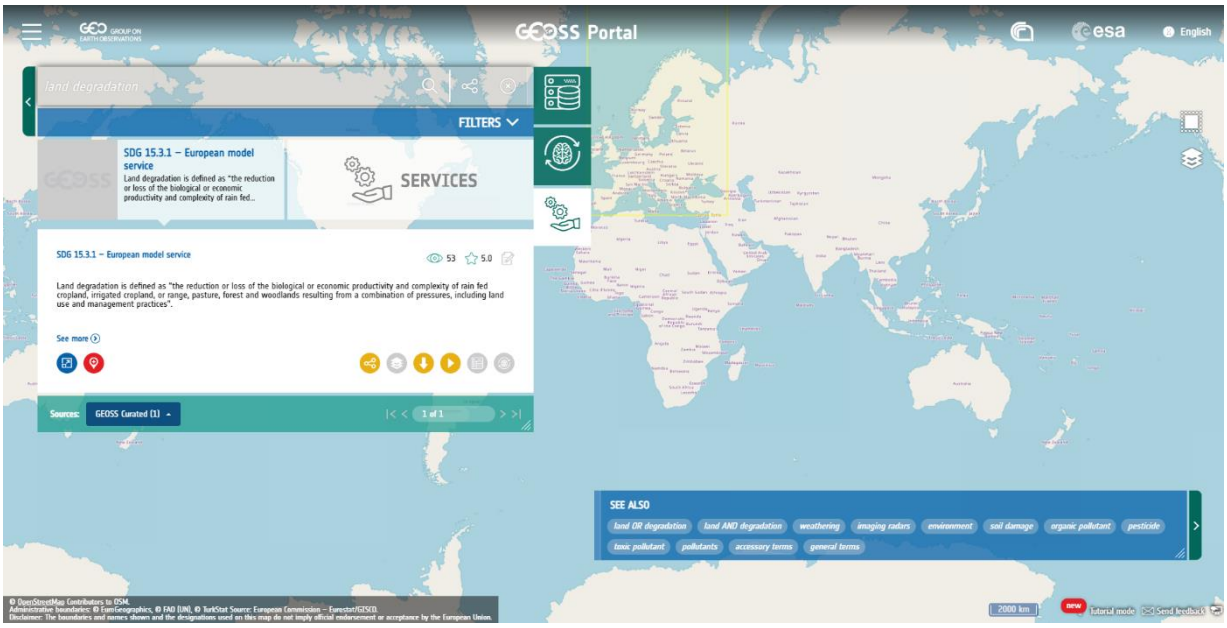

Figure 25. SDG model description

After clicking the "Workflow" button, the user can see the service workflow and configure their own run. In particular, the user shall be enabled to inspect the process workflow and search and select data as input to the service. In case the user has registered newly data, the user shall be enabled to discover and select them. In addition, the user shall have the capability to choose a Cloud computing platform of preference among the available (these include all the DIAS Platforms and Amazon Web Services).

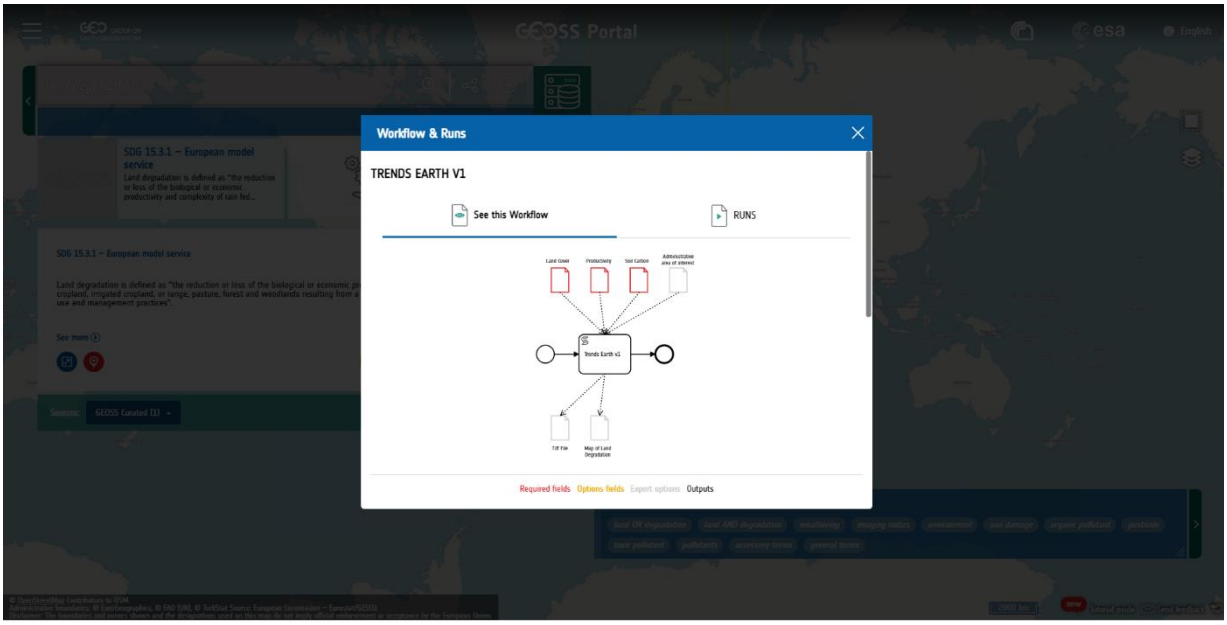

Figure 26. SDG workflow

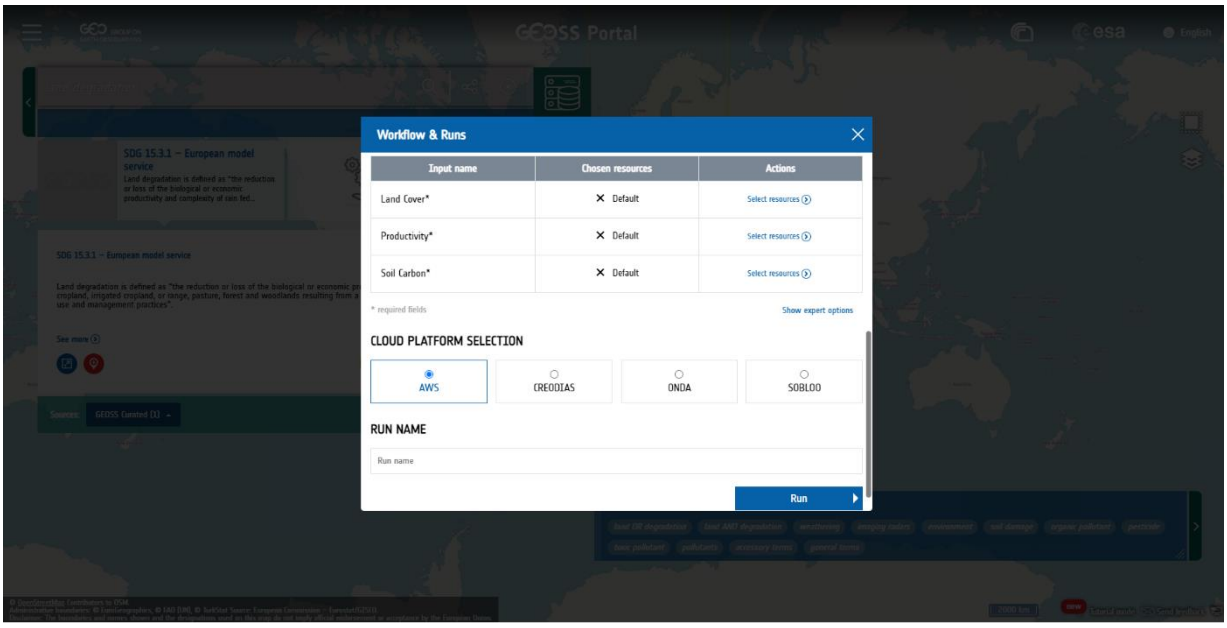

Figure 27. Data input

The last part of the configuration is providing a name for the computation and pressing the "run" button (available only for logged users).
A finished run can be accessed by logged user in the "Runs" tab of the Workflow and Runs window within my Workspace section. The creator of the computation has the access to the edit mode which allows for dashboard creation. The user shall be able to visualize a customizable dashboard as the service output, where it is possible to extract additional information and to generate report, statistics about land degradation. The user shall be enabled to visualize the values resulting from the calculation of SDG indicator 15.3.1 as a layer on the map, with storytelling feature.

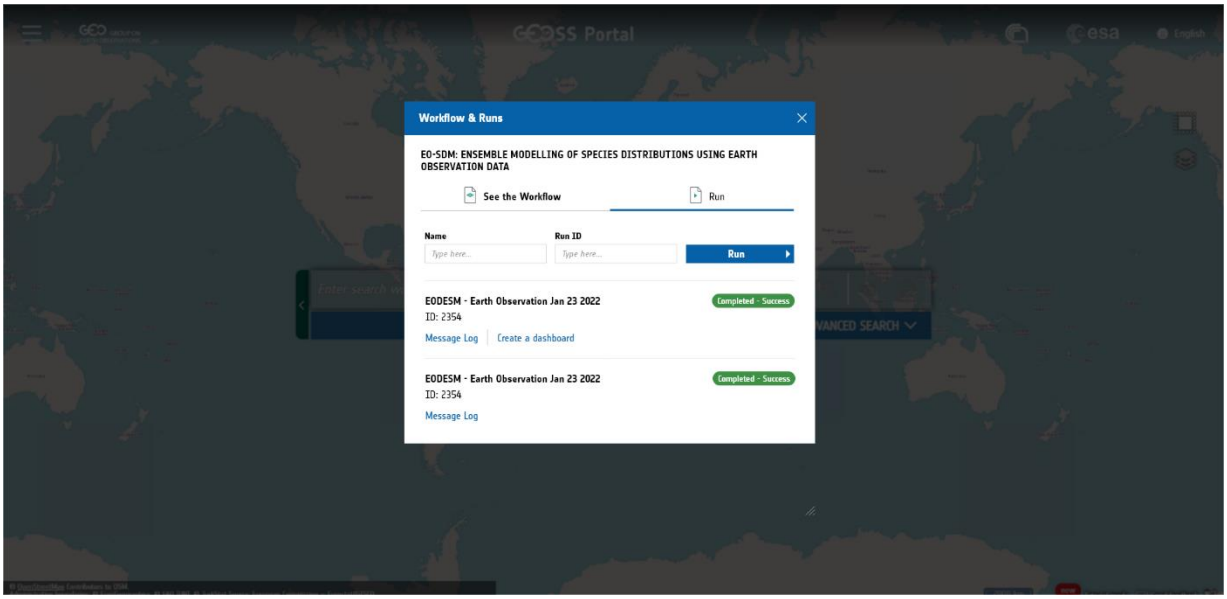

Figure 28. Finished run

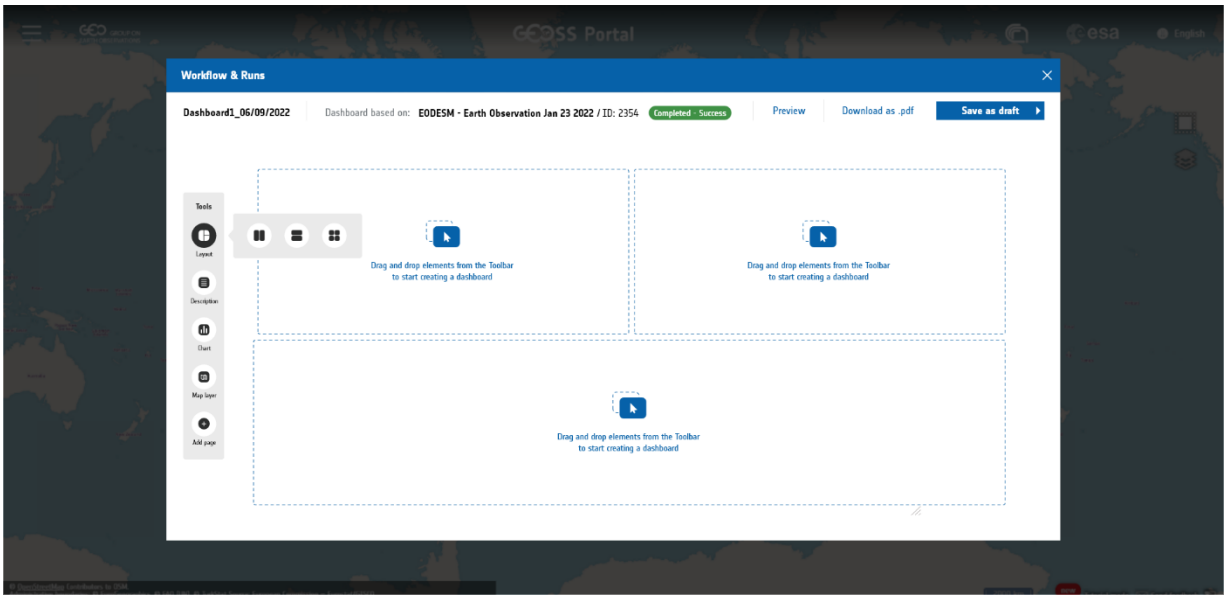

Figure 29. Dashboard configuration – layout

The users shall be enabled to add the finished dashboard in My Workspace menu and share it with the specified users.

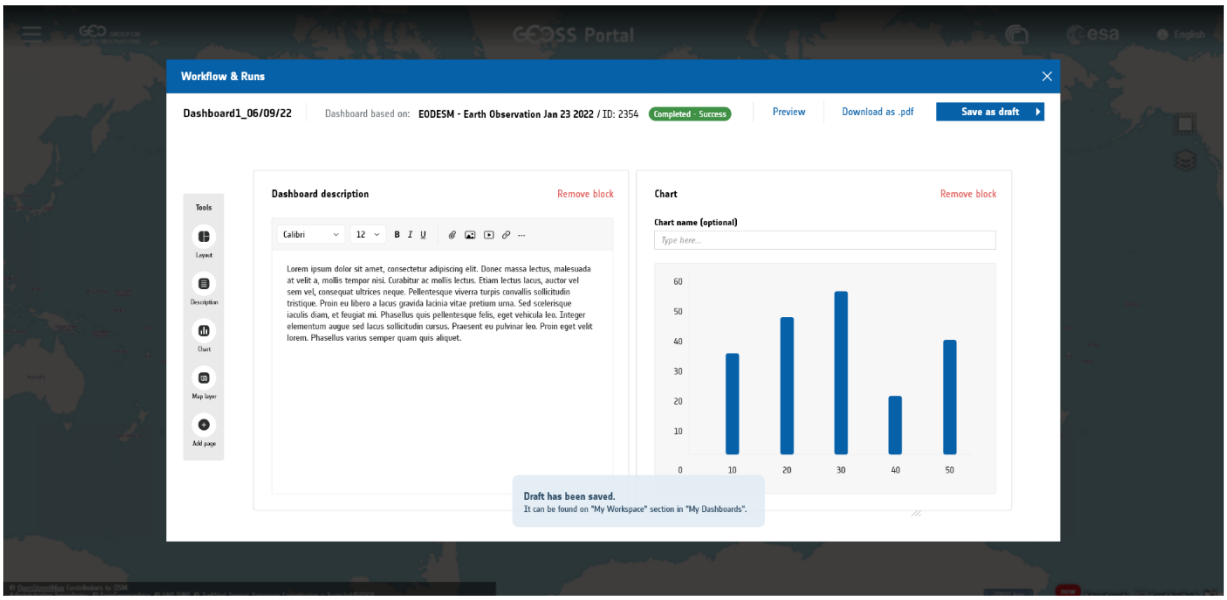

Figure 30. Dashboard configuration – content

The user could be enabled to share the dashboard with all the GEOSS users, upon verification by the Administrator. The Administrator could accept the dashboard, which will make it accessible within search (tab information) for other Users, or could reject the publication of such dashboard and provide reasons why this action has taken place. After this notification, the user could be enabled to update the dashboard according to information provided by Administrator or discard the whole process. A dashboard without search visibility can be accessed only through a direct link.

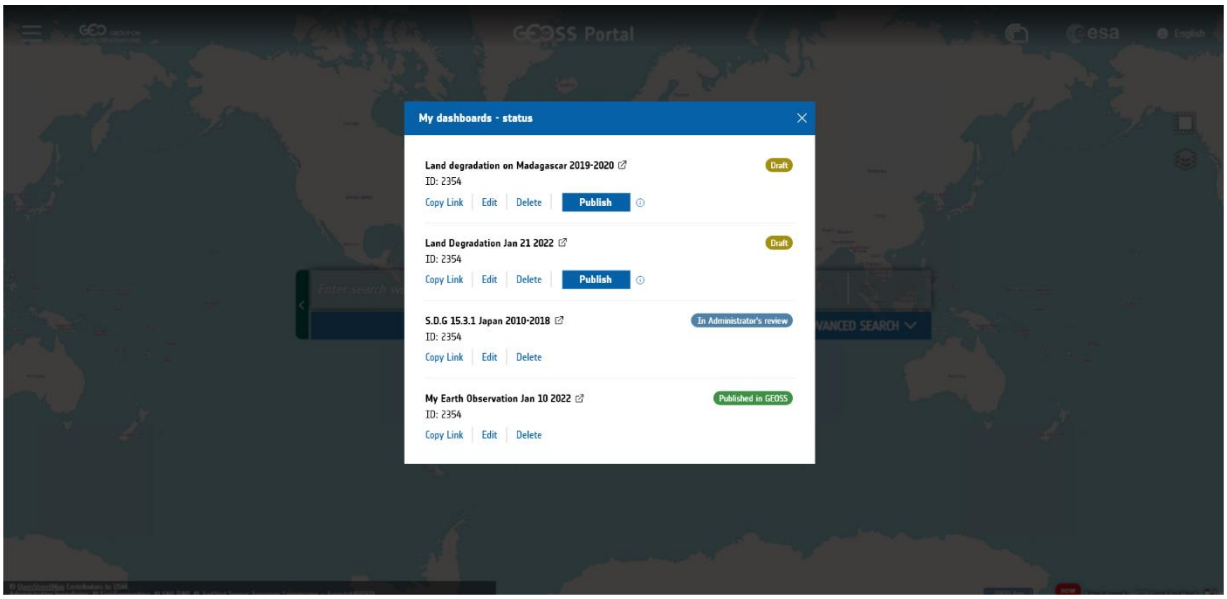

Figure 31. My dashboards tab

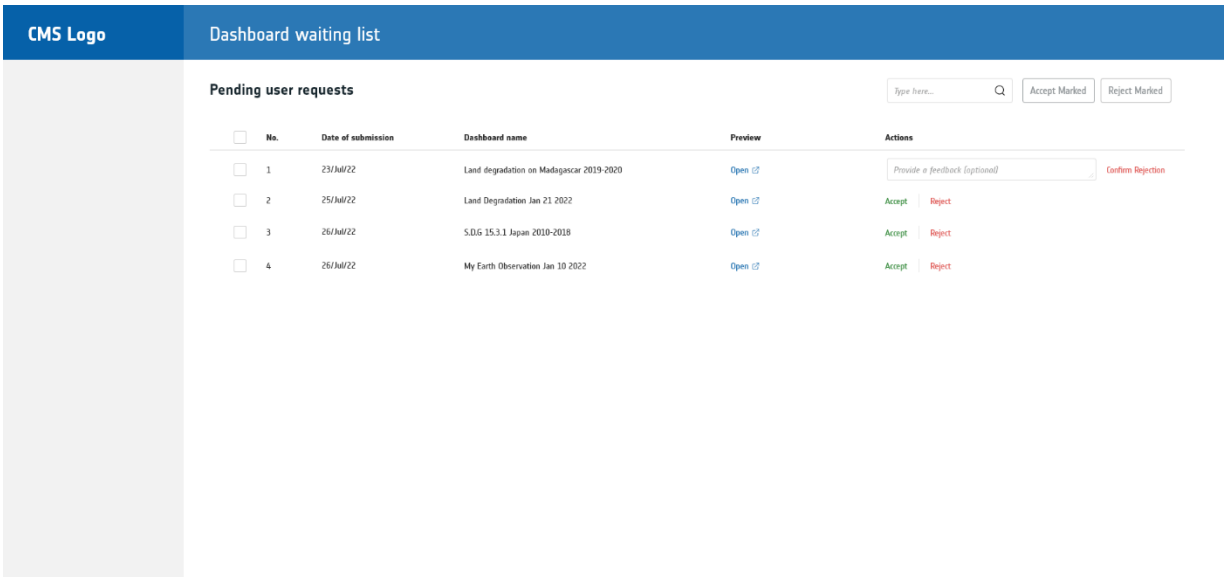

Figure 32. Administrator view - waiting list

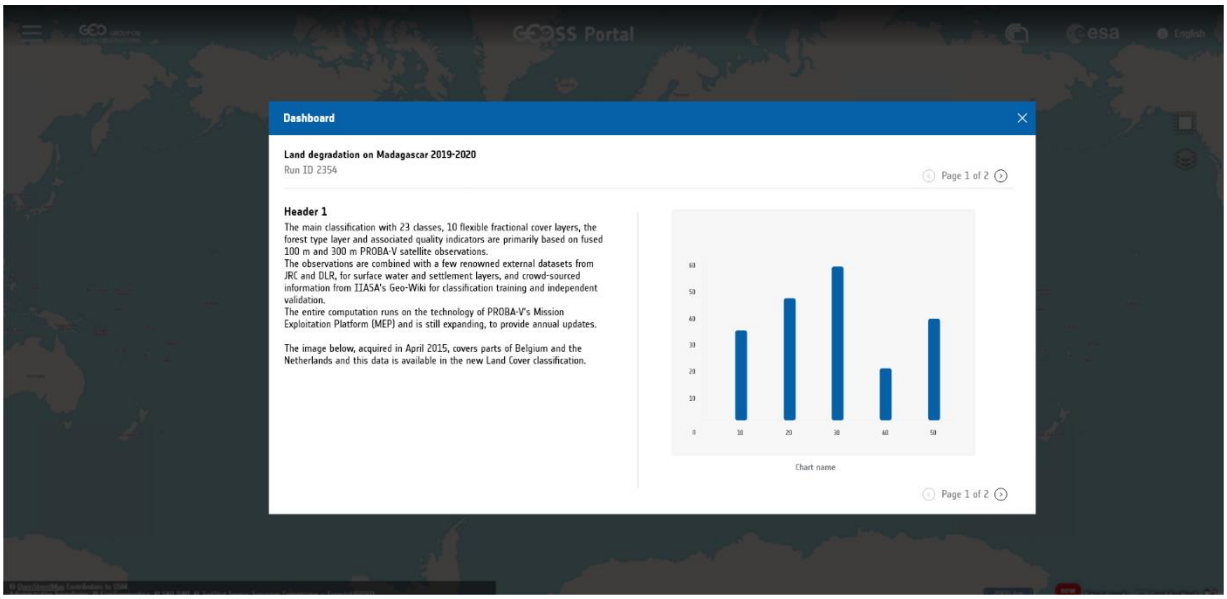

Figure 33. Finished dashboard - text and chart

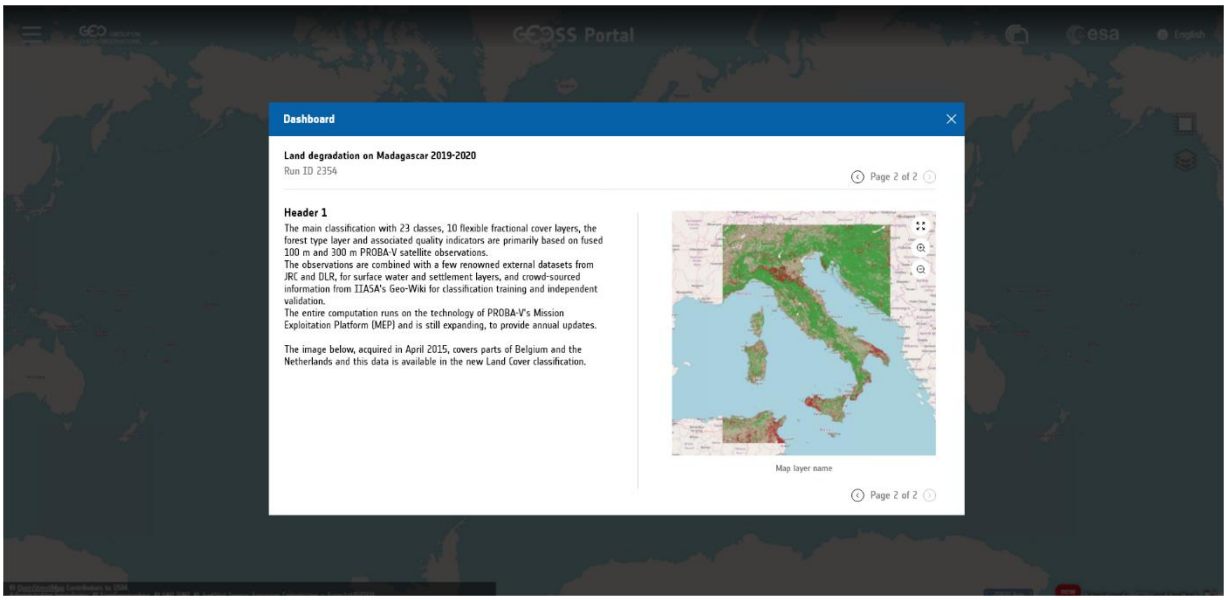

Figure 34. Finished dashboard - text and map

Source scenarios

S1 Resources discovery and access with linked information (relationships)
S2 Service Use
S3 Resources Registration
S6 Exploiting discovery and access capabilities
S9 Replicating an experiment/ research activity
S10 Reusing an experiment/ research result

Linked User Requirements

- UR-LDG-01 – SDG indicator 15.3.1 computation service discovery
- UR-LDG-02 – SDG indicator 15.3.1 computation service execution
- UR-LDG-03 – Visual representation of SDG indicator 15.3.1 computations
- UR-LDG-04 – My Workspace Dashboard
- UR-LDG-05- Acceptance of the visualizations

Acceptance Criteria:

UR-LDG-01 – SDG indicator 15.3.1 computation service discovery

- After searching "Land degradation" in the search box, the user receives a number of results associated with the SDG indicator 15.3.1.
- The results are grouped in switchable tabs: Data, Information and Services.
- Various filters can be applied to the search results to narrow them down.

UR-LDG-02 – SDG indicator 15.3.1 computation service execution

- In the search results, specifically in the Services tab, the user can find the item called "SDG 15.3.1 – European model service".
- After clicking this item, the user can see a brief model description and click the "Workflow" arrow button below to enter the computation service.
- The user can see the workflow graph and choose the area of interest from the data list provided by the service as an input, separately for Land Cover, Productivity, Soil Carbon and an additional input available after clicking the link named "Show expert options".
- The user can select the cloud computing platform, name their run and start the computation.
- The "Run" button is accessible only to logged users.

UR-LDG-03 – Visual representation of SDG indicator 15.3.1 computations

- When the computation is completed, the user can access it in the tab "Runs" next to the workflow options.
- The user who created a computation sees a button next to it accessing the edit mode, where they can visualize the service output as a customizable dashboard.
- The user can create any number from the following dashboard elements:
    - Dashboard description – can be edited by the user in the text editor (it's possible to paste graphics, films, links, WYSIWYG),
    - Charts – can't be edited,
    - Layers on the map using the coordinates included in data – can't be edited,
    - Reports & statistics in the form of a dashboard exported to a downloadable .pdf file – can't be edited.
- If the user chooses more than one dashboard element, the pagination is applied to each subsequent element.

UR-LDG-04 – My Workspace Dashboard

- At the end of dashboard's edit mode the user can see:
    - A button "Add to My Workspace",
    - A switch button "Draft/Finished".
- Clicking the "Add to My Workspace" button results in creating a link to "My Dashboards" page in "My Workspace" section. Otherwise, the dashboard can be accessed by the user only through the "Runs" tab.
- The "Add to My Workspace" button can't be "unclicked". Once created dashboard can be deleted only in "My Dashboards" page.
- A switch button "Draft/Finished" is set to "Draft" in default. The user can change it to "Finished" when in their opinion the dashboard is ready for publication or private sharing.

- On “My Dashboards” page the user sees a list of finished runs for which the user have started the creation of the dashboard. Next to each position on the list the user can see the set of management buttons:
    - “Draft/Finished” Switch button,
    - Edit – redirects the user to the edit mode,
    - Copy link – clicking causes a small box “link has been copied”, available only for “Finished” dashboards, otherwise greyed out,
    - Publish – submits the dashboard for the administrator’s review, available only for “Finished” dashboards, otherwise greyed out,
    - Delete – the deletion of finished and published dashboards must be approved by the administrator. Before sending the request the user sees a confirmation box. Dashboards waiting for the deletion are marked and have all buttons greyed out.

UR-LDG-05- Acceptance of the visualizations

- After finishing the dashboard the user can make it accessible to everyone on the GEOSS Platform as one of the search results (in the Information tab) by submitting the dashboard for the administrator’s review, using the button “Publish” in “My Dashboards” page.
- The administrator receives a notification about a new submission and can access the list of pending requests. They can:
    - Accept the submission, which results in visualizations being visible and possible to search by any user;
    - Reject the submission by pointing out the reasons for such a decision.
- The user receives a notification containing the administrator’s decision. If the submission was rejected they can:
    - Update the dashboard according to the administrator’s note;
    - Discard the whole submission process, which results in visualizations being visible only to the author and specific people they decide to share it with.

Priority
High

Stability
Stable

Affected/Used GEOSS Platform Components
GEOSS Portal, GEO DAB

3.4. SR-FUN-004 – Data discovery (with relationships to associated concepts)

Identifier
SR-FUN-004

Title
Data Discovery (with relationships to associated concepts)

Requirement Description
The GEOSS Platform shall enable users to search for data, which might be satellite, in situ or other. S(he) will perform searches using natural language and will receive all the results

regarding the searched concept without need to switch between data types and sources. Additionally, it shall allow them to extend their knowledge by checking related topics, viewing search term definitions, related services, information, data.
Each item (data or product) in a list resulting from a user data query shall be equipped with the following: (i) If any, associated *relationships* (context, use, description, related concepts, etc.) and link to corresponding source; (ii) If any, provenance information (how and when the product has been generated, which services/computing resources have been used, validation information); (iii) If any, associated services, including (a) links to services that can be used with this product as input, (b) links to services that can be used to generate this kind of product.
Concerning in-situ data a separate tag for in-situ data is required. For existing (legacy) data could a smart way of selecting the in-situ data sets and tagging them could be investigated, or GEO could approach the providers to indicate if the data is in-situ data. Regarding Maps4GPP see UC-MPS-03 – Exploring and leveraging the WorldCereal harmonized in-situ reference data repository in [RD-3] GPP-DEL-WP2-D2.5-v1.0 Use Cases Description and User Requirements Document v3.

Source scenarios

S1 Resources discovery and access with linked information
S9 Replicating an experiment
S10 Reusing an experiment

Linked User Requirements

- UR-EIF-01 – Discovery of Eiffel Pilot 3 data
- UR-EIF-03 – Discovery of Eiffel Pilot 4 data
- UR-ATL-01 – Discovery and Access to the EMODnet Marine Physics Datasets
- UR-MEB-01 – Discovery and Access to the Ospar Data
- UR-MEB-02 – Discovery and Access to the Ospar Intermediate Assessment
- UR-MEB-03 – Discovery and Access to the EMODnet Biology
- UR-MEB-04 – Discovery and Access to the EMODnet Biology - non-indigenous species
- UR-MEB-05 – Discovery and Access to the Joint Copernicus Marine – tracking whales' data
- UR-MEB-06 – Discovery and Access to the Soft Corals Article
- UR-MEB-07 – Discovery and Access to the Ecosystem Services Article
- UR-MAC-01 – Discovery and Access to the EMODnet Chemistry, EU baseline
- UR-MAC-02 – Discovery and Access to the EMODnet Chemistry, Marine Litter
- UR-CCP-02 - Norovirus epidemiologic data
- UR-CCP-03 – IPCC scenarios data
- UR-CCP-04 – Species Distribution data
- UR-GSA-02 – GSA (Green Space Accessibility) data
- UR-MPS-05 – Discovery, access and inspection of WorldCereal or AGROSTAC harmonized in-situ reference data
- UR-AGA-01 – Gross Primary Production product discovery
- UR-AGA-02 – Gross Primary Production product visualization
- UR-AGA-03 – Gross Primary Production training materials discovery
- UR-AGA-04 – Gross Primary Production computation service execution
- UR-AGA-05 – Gross Primary Production product specification/definition
- UR-AGA-06 – Gross Primary Production product support/feedback

- UR-HAR-01 – Discovery of Harmonia data on urban heat fluxes and heat emissions

Priority
High

Stability
Stable.

Affected/Used GEOSS Platform Components
GEO DAB, GEOSS Portal

3.5. SR-FUN-005 – Service Discovery (with relationships to associated concepts)

Identifier
SR-FUN-005

Title
Service Discovery (with relationships to associated concepts)

Requirement Description
The GEOSS Platform shall enable users to discover previously registered services e.g. software applications (processing services) implementing a "model" used in an experiment, based on user search criteria that include:

- Service Name;
- Service Provider;
- Geographical area of interest;
- Access Conditions;
- Input Data;
- Output Data.

They shall be equipped with links to related concepts, e.g. context, type of input or output data, etc.

Source scenarios
S1 Resources discovery and access with linked information
S10 Reusing an experiment

Linked User Requirements

- UR-LDG-01 – SDG indicator 15.3.1 computation service discovery UR-EIF-03 – Discovery of Eiffel Pilot 4 data
- UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service
- UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services
- UR-CCP-01 - Norovirus Risk Maps Model based on ecological niches
- UR-MPS-06 – Crop map
- UR-MPS-07 – Access and trigger WorldCereal processing module
- UR-MPS-08 – Visualization of crop map and saving in personal workspace
- UR-AGA-04 – Gross Primary Production computation service execution
- UR-GSA-01 – Urban Green Spaces Accessibility Model

Priority
High

Stability
Stable.

Affected/Used GEOSS Platform Components
GEO DAB, GEOSS Portal

3.6. SR-FUN-006 – Information Discovery (with relationships to associated concepts)

Identifier
SR-FUN-006

Title
Information Discovery (with relationships to associated concepts)

Requirement Description
The GEOSS Platform shall enable users to discover information of all kinds, including experiment results, value added products, publications, websites, along with relationships with associated concepts. In the case of value added products, for instance, these relationships might include information regarding how they were generated, details regarding the service or the model used, with identification of all the steps (recipe), and data used to generate that product. The information resources could be consolidated into one or multiple knowledge packages, which shall contain resources on data, software, model, algorithms, feedback, documentation, training materials (including e.g. product factsheet). Product promotion and communication could be conducted via the the GEO Knowledge Hub (https://gkhub.earthobservations.org/).

Source scenarios
S1 Resources discovery and access with linked information
S7 Discovering knowledge regarding the generation of a product or the execution of an experiment
S8 Reproducing an experiment
S9 Replicating an experiment
S10 Reusing an experiment

Linked User Requirements
- UR-LDG-05- Acceptance of the visualizations
- UR-AFG-06 - Accessing data, information and knowledge from AfriGEOSS
- UR-ATL-01 – Discovery and Access to the EMODnet Marine Physics Datasets
- UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service
- UR-MEB-01 – Discovery and Access to the Ospar Data
- UR-MEB-02 – Discovery and Access to the Ospar Intermediate Assessment
- UR-MEB-03 – Discovery and Access to the EMODnet Biology
- UR-MEB-04 – Discovery and Access to the EMODnet Biology - non-indigenous species
- UR-MEB-05 – Discovery and Access to the Joint Copernicus Marine – tracking whales' data
- UR-MEB-06 – Discovery and Access to the Soft Corals Article

- UR-MEB-07 – Discovery and Access to the Ecosystem Services Article
- UR-MAC-01 – Discovery and Access to the EMODnet Chemistry, EU baseline
- UR-MAC-02 – Discovery and Access to the EMODnet Chemistry, Marine Litter
- UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services
- UR-EIF-01 – Discovery of Eiffel Pilot 3 data
- UR-EIF-03 – Discovery of Eiffel Pilot 4 data
- UR-MPS-02 – Register WorldCereal in-situ data and guidelines
- UR-MPS-04 – Thematic area “in-situ data crop”
- UR-MPS-08 – Visualization of crop map and saving in personal workspace
- UR-LDG-01 – SDG indicator 15.3.1 computation service discovery UR-EIF-03 – Discovery of Eiffel Pilot 4 data
- UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service
- UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services
- UR-CCP-01 - Norovirus Risk Maps Model based on ecological niches
- UR-MPS-06 – Crop map
- UR-MPS-07 – Access and trigger WorldCereal processing module
- UR-MPS-08 – Visualization of crop map and saving in personal workspace
- UR-AGA-04 – Gross Primary Production computation service execution

Priority
High

Stability
Stable.

Affected/Used GEOSS Platform Components
GEO DAB, GEOSS Portal

3.7. SR-FUN-007 – Inspection of search results

Identifier
SR-FUN-007

Title
Inspection of search results

Requirement Description
The GEOSS Platform shall enable users to inspect the results of a search for data, services, or information. The inspection is the capability for users to browse through the results of a search, filter them based on keywords, analyse the metadata and the user feedback, and might visualize them on a map. Filters, relevant for Maps4GPP, are region (or user defined boundary box), year, crop type, and quality level (see use case UC-MPS-03 in D2.5 [RD-3]). No advanced functionality is required to visualize and analyze the outcome of the service in GOESS platform dashboard.

Source scenarios
S1 Resources discovery and access with linked information
S7 Discovering knowledge regarding the generation of a product or the execution of an experiment
S8 Reproducing an experiment

S9 Replicating an experiment
S10 Reusing an experiment

Linked User Requirements

- UR-LDG-01 – SDG indicator 15.3.1 computation service discovery
- UR-LDG-04 – My Workspace Dashboard
- UR-LDG-05- Acceptance of the visualizations
- UR-EIF-01 – Discovery of Eiffel Pilot 3 data
- UR-EIF-02 – Access and visualization of Eiffel Pilot 3 data
- UR-EIF-03 – Discovery of Eiffel Pilot 4 data
- UR-EIF-04 – Access and visualization of Eiffel Pilot 4 data
- UR-AFG-06 - Accessing data, information and knowledge from AfriGEOSS
- UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service
- UR-MEB-01 – Discovery and Access to the Ospar Data
- UR-MEB-02 – Discovery and Access to the Ospar Intermediate Assessment
- UR-MEB-03 – Discovery and Access to the EMODnet Biology
- UR-MEB-04 – Discovery and Access to the EMODnet Biology - non-indigenous species
- UR-MEB-05 – Discovery and Access to the Joint Copernicus Marine – tracking whales' data
- UR-MEB-06 – Discovery and Access to the Soft Corals Article
- UR-MEB-07 – Discovery and Access to the Ecosystem Services Article
- UR-MAC-01 – Discovery and Access to the EMODnet Chemistry, EU baseline
- UR-MAC-02 – Discovery and Access to the EMODnet Chemistry, Marine Litter
- UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services
- UR-CCP-01 - Norovirus Risk Maps Model based on ecological niches
- UR-CCP-02 - Norovirus epidemiologic data
- UR-CCP-03 – IPCC scenarios data
- UR-CCP-04 – Species Distribution data
- UR-GSA-01 – Urban Green Spaces Accessibility Model
- UR-GSA-02 – GSA Data
- UR-MPS-02 – Register WorldCereal in-situ data and guidelines
- UR-MPS-05 – Discovery, access and inspection of WorldCereal or AGROSTAC harmonized in-situ reference data
- UR-MPS-08 – Visualization of crop map and saving in personal workspace
- UR-AGA-02 – Gross Primary Production product visualization
- UR-AGA-03 – Gross Primary Production training materials discovery
- UR-AGA-08 – Gross Primary Production product documentation
- UR-AGA-09 – Gross Primary Production training materials discovery
- UR-AGA-10 – Gross Primary Production product Metadata
- UR-AGA-13 – Gross Primary Production Metadata specification and provision

Priority

High

Stability

Stable.

Affected/Used GEOSS Platform Components
GEO DAB, GEOSS Portal

3.8. SR-FUN-008 – Selection of search results

Identifier
SR-FUN-008

Title
Selection of search results

Requirement Description
The GEOSS Platform shall enable users to select the results of a search for data, services, or knowledge. The selection is the capability for the user to choose one or more particular result items, as a consequence of inspection, and to visualize further details about it.

Source scenarios
S1 Resources discovery and access with linked information
S7 Discovering knowledge regarding the generation of a product or the execution of an experiment
S8 Reproducing an experiment
S9 Replicating an experiment
S10 Reusing an experiment

Linked User Requirements
- UR-LDG-01 – SDG indicator 15.3.1 computation service discovery
- UR-LDG-04 – My Workspace Dashboard
- UR-LDG-05- Acceptance of the visualizations
- UR-EIF-01 – Discovery of Eiffel Pilot 3 data
- UR-EIF-02 – Access and visualization of Eiffel Pilot 3 data
- UR-EIF-03 – Discovery of Eiffel Pilot 4 data
- UR-EIF-04 – Access and visualization of Eiffel Pilot 4 data
- UR-AFG-06 - Accessing data, information and knowledge from AfriGEOSS
- UR-ATL-01 – Discovery and Access to the EMODnet Marine Physics Datasets
- UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service
- UR-MEB-01 – Discovery and Access to the Ospar Data
- UR-MEB-02 – Discovery and Access to the Ospar Intermediate Assessment
- UR-MEB-03 – Discovery and Access to the EMODnet Biology
- UR-MEB-04 – Discovery and Access to the EMODnet Biology - non-indigenous species
- UR-MEB-05 – Discovery and Access to the Joint Copernicus Marine – tracking whales' data
- UR-MEB-06 – Discovery and Access to the Soft Corals Article
- UR-MEB-07 – Discovery and Access to the Ecosystem Services Article
- UR-MAC-01 – Discovery and Access to the EMODnet Chemistry, EU baseline
- UR-MAC-02 – Discovery and Access to the EMODnet Chemistry, Marine Litter
- UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services
- UR-CCP-01 - Norovirus Risk Maps Model based on ecological niches
- UR-CCP-02 - Norovirus epidemiologic data

- UR-CCP-03 – IPCC scenarios data
- UR-CCP-04 – Species Distribution data
- UR-GSA-01 – Urban Green Spaces Accessibility Model
- UR-GSA-02 – GSA Data
- UR-MPS-02 - Register WorldCereal in-situ data guidelines
- UR-MPS-05 – Discovery, access and inspection of WorldCereal or AGROSTAC harmonized in-situ reference data
- UR-AGA-02 – Gross Primary Production product visualization
- UR-AGA-03 – Gross Primary Production training materials discovery
- UR-AGA-08 – Gross Primary Production product documentation
- UR-AGA-09 – Gross Primary Production training materials discovery
- UR-AGA-10 – Gross Primary Production product Metadata
- UR-AGA-13 – Gross Primary Production Metadata specification and provision

Priority
High

Stability
Stable.

Affected/Used GEOSS Platform Components
GEO DAB, GEOSS Portal

3.9. SR-FUN-009 – Access to selected resource

Identifier
SR-FUN-009

Title
Access to selected resource

Requirement Description
The GEOSS Platform shall enable users to reach the resource (Data, Service, Information) of interest (among the result items of a search) for use in their analysis. This might include their visualization - on a map, in case of georeferenced resources, and might include a *download*, depending on the type of resource and on the intended use.

Source scenarios
S1 Resources discovery and access with linked information
S7 Discovering knowledge regarding the generation of a product or the execution of an experiment
S8 Reproducing an experiment
S9 Replicating an experiment
S10 Reusing an experiment

Linked User Requirements
- UR-LDG-01 – SDG indicator 15.3.1 computation service discovery
- UR-LDG-04 – My Workspace Dashboard
- UR-LDG-05- Acceptance of the visualizations
- UR-AFG-06 - Accessing data, information and knowledge from AfriGEOSS
- UR-EIF-02 – Access and visualization of Eiffel Pilot 3 data

- UR-EIF-04 – Access and visualization of Eiffel Pilot 4 data
- UR-ATL-01 – Discovery and Access to the EMODnet Marine Physics Datasets
- UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service
- UR-MEB-01 – Discovery and Access to the Ospar Data
- UR-MEB-02 – Discovery and Access to the Ospar Intermediate Assessment
- UR-MEB-03 – Discovery and Access to the EMODnet Biology
- UR-MEB-04 – Discovery and Access to the EMODnet Biology - non-indigenous species
- UR-MEB-05 – Discovery and Access to the Joint Copernicus Marine – tracking whales' data
- UR-MEB-06 – Discovery and Access to the Soft Corals Article
- UR-MEB-07 – Discovery and Access to the Ecosystem Services Article
- UR-MAC-01 – Discovery and Access to the EMODnet Chemistry, EU baseline
- UR-MAC-02 – Discovery and Access to the EMODnet Chemistry, Marine Litter
- UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services
- UR-CCP-01 - Norovirus Risk Maps Model based on ecological niches
- UR-CCP-02 - Norovirus epidemiologic data
- UR-CCP-03 – IPCC scenarios data
- UR-CCP-04 – Species Distribution data
- UR-GSA-01 – Urban Green Spaces Accessibility Model
- UR-GSA-02 – GSA Data
- UR-MPS-05 – Discovery, access and inspection of WorldCereal or AGROSTAC harmonized in-situ reference data
- UR-AGA-02 – Gross Primary Production product visualization
- UR-AGA-03 – Gross Primary Production training materials discovery
- UR-AGA-08 – Gross Primary Production product documentation
- UR-AGA-09 – Gross Primary Production training materials discovery
- UR-AGA-10 – Gross Primary Production product Metadata
- UR-AGA-13 – Gross Primary Production Metadata specification and provision
- UR-HAR-02 – Access and analysis of Harmonia data on urban heat fluxes and heat emissions

Priority
High

Stability
Stable

Affected/Used GEOSS Platform Components
GEOSS Portal, GEO DAB

3.10. SR-FUN-010 – Service execution

Identifier
SR-FUN-010

Title
Service Execution

Requirement Description

The GEOSS Platform shall enable users to execute registered processing services, which means enabling the use of interfaced external processing power provided by a processing platform to elaborate, according to the model implemented by the service, the input data, for transforming them into the resulting products.

This means that the GEOSS Platform shall enable users who access a service to define/refine the area of interest and time range, crop type (relevant for Maps4GPP), search for and select the input data, select the Cloud Computing platform of preference among the available and start the service execution. The user shall also be able to visualize information on the underlying workflow and logging info.

For crop map services in Maps4GPP the user needs to log-on to the WorldCereal system (not for access harmonized reference data). In addition, the services will run within the WorldCereal system, managed via APIs, and need to be invoked from the GEOSS platform. See UC-MPS-04 for UI.

A user who has started the execution of a service shall be notified via email when the processing ends and shall find the processing results in the personal workspace.

Source scenarios

S2 Service Use
S8 Reproducing an experiment
S9 Replicating an experiment
S10 Reusing an experiment

Linked user requirements

- UR-LDG-02 – SDG indicator 15.3.1 computation service execution
- UR-LDG-04 – My Workspace Dashboard
- UR-CCP-01 - Norovirus Risk Maps Model based on ecological niches
- UR-CCP-05 – GWP/VLab Enhancement
- UR-GSA-01 – Urban Green Spaces Accessibility Model
- UR-MPS-07 – Access and trigger WorldCereal processing module
- UR-AGA-04 – Gross Primary Production computation service execution (Note: For AGAME static provision of data products using computation services are implemented in the first iteration)

Priority

High

Stability

Stable, in so far as the corresponding user requirements are stable. See D2.1.

Affected/Used GEOSS Platform Components

GEOSS DAB, GEOSS Portal, GEOSS APIs.

3.11. SR-FUN-011– Data provision (registration)

Identifier

SR-FUN-011

Title

Data provision (registration)

Requirement Description

The GEOSS Platform shall enable users to register their data (in situ, satellite, websites, publications, etc.) according to a defined metadata model. Registered data, once approved, shall become discoverable through the GEOSS Platform.
For AGAME in addition reference to the eLTER facility (deims.id, e.g. https://deims.org/d4854af8-9d9f-42a2-af96-f1ed9cb25712) and reference to the eLTER Standard Observation as part of the metadata is relevant.

Source scenarios

S3 Resources Registration
S4 Promotion and collaboration

Linked User Requirements

- UR-EIF-02 – Access and visualization of Eiffel Pilot 3 data
- UR-EIF-04 – Access and visualization of Eiffel Pilot 4 data
- UR-ATL-01 – Discovery and Access to the EMODnet Marine Physics Datasets
- UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service
- UR-MEB-01 – Discovery and Access to the Ospar Data
- UR-MEB-02 – Discovery and Access to the Ospar Intermediate Assessment
- UR-MEB-03 – Discovery and Access to the EMODnet Biology
- UR-MEB-04 – Discovery and Access to the EMODnet Biology - non-indigenous species
- UR-MEB-05 – Discovery and Access to the Joint Copernicus Marine – tracking whales' data
- UR-MEB-06 – Discovery and Access to the Soft Corals Article
- UR-MEB-07 – Discovery and Access to the Ecosystem Services Article
- UR-MAC-01 – Discovery and Access to the EMODnet Chemistry, EU baseline
- UR-MAC-02 – Discovery and Access to the EMODnet Chemistry, Marine Litter
- UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services
- UR-CCP-02 - Norovirus epidemiologic data
- UR-CCP-03 – IPCC scenarios data
- UR-CCP-04 – Species Distribution data
- UR-GSA-01 – Urban Green Spaces Accessibility Model
- UR-GSA-02 – GSA Data
- UR-MPS-03 - Register in-situ data providers
- UR-AGA-07 – Gross Primary Production product /workflow integration into eLTER cyberinfrastructure
- UR-AGA-08 – Gross Primary Production product documentation
- UR-AGA-09 – Gross Primary Production training materials discovery
- UR-AGA-10 – Gross Primary Production product Metadata
- UR-AGA-11 – Gross Primary Production Product support/feedback
- UR-AGA-12 – Gross Primary Production product specification / definition
- UR-AGA-13 – Gross Primary Production Metadata specification and provision
- UR-AGA-14 – Gross Primary Production product API - data provision
- UR-AGA-15 – Gross Primary Production product documentation/knowledge package
- UR-AGA-16 – Gross Primary Production product quality check
- UR-AGA-17 – Gross Primary Production product communication channels

- UR-AGA-18 – Gross Primary Production product data policies

Priority
High

Stability
Stable

Affected/Used GEOSS Platform Components
GEOSS Platform, GEO DAB

3.12. SR-FUN-012 – Services provision (registration)

Identifier
SR-FUN-012

Title
Service provision (registration)

Requirement Description
The GEOSS Platform shall enable service providers to register services based on metadata defined in the service definition model, which include:

- Service Name;
- Service Icon;
- Service Provider;
- Contact;
- Service Description;
- Service Coverage;
- Service Endpoint;
- Access Conditions;
- Input Data;
- Output Data;
- Other Service-specific metadata.

Source scenarios
S3 Resources Registration
S4 Promotion and collaboration

Linked User Requirements

- UR-LDG-01 – SDG indicator 15.3.1 computation service discovery
- UR-LDG-02 – SDG indicator 15.3.1 computation service execution
- UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service
- UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services
- UR-EIF-03 – Discovery of Eiffel Pilot 4 data
- UR-CCP-01 - Norovirus Risk Maps Model based on ecological niches
- UR-GSA-01 – Urban Green Spaces Accessibility Model
- UR-MPS-06 – Crop map
- UR-MPS-07 – Access and trigger WorldCereal processing module
- UR-MPS-08 – Visualization of crop map and saving in personal workspace
- UR-AGA-04 – Gross Primary Production computation service execution (Note: AGAME workflow could be deployed in a cloud computing infrastructure such as

VLabs to provide a computation service. AGAME Gross Primary Production computation services could be registered later in GEOSS platform based on metadata defined in the service definition model and allow the service to be discoverable in GEOSS Platform. The computation service will allow users to replicate AGAME Gross Primary Production products and extend the period of analysis for upcoming years when new satellite imagery from Sentinel-2 is available.)

Priority
High

Stability
Stable.

Affected/Used GEOSS Platform Components
GEO DAB, GEOSS Portal

3.13. SR-FUN-013 – Information provision (registration)

Identifier
SR-FUN-013

Title
Knowledge provision (registration)

Requirement Description
The GEOSS Platform shall enable information providers to link their resources to GEOSS and to describe them with metadata, to define related resources and to add relationships (in general, to edit related information).

Source scenarios
S3 Resources Registration
S4 Promotion and collaboration
S7 Discovering an experiment/ research result
S8 Reproducing an experiment
S9 Replicating an experiment
S10 Reusing an experiment

Linked User Requirements
- UR-LDG-03 – Visual representation of SDG indicator 15.3.1 computations
- UR-ATL-01 – Discovery and Access to the EMODnet Marine Physics Datasets
- UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service
- UR-MEB-01 – Discovery and Access to the Ospar Data
- UR-MEB-02 – Discovery and Access to the Ospar Intermediate Assessment
- UR-MEB-03 – Discovery and Access to the EMODnet Biology
- UR-MEB-04 – Discovery and Access to the EMODnet Biology - non-indigenous species
- UR-MEB-05 – Discovery and Access to the Joint Copernicus Marine – tracking whales' data
- UR-MEB-06 – Discovery and Access to the Soft Corals Article
- UR-MEB-07 – Discovery and Access to the Ecosystem Services Article
- UR-MAC-01 – Discovery and Access to the EMODnet Chemistry, EU baseline

- UR-MAC-02 – Discovery and Access to the EMODnet Chemistry, Marine Litter
- UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services
- UR-EIF-01 – Discovery of Eiffel Pilot 3 data
- UR-EIF-03 – Discovery of Eiffel Pilot 4 data
- UR-MPS-07 – Access and trigger WorldCereal processing module (register as package in GKH)
- UR-AGA-08 – Gross Primary Production product documentation
- UR-AGA-09 – Gross primary production training material discovery
- UR-AGA-15 – Gross Primary Production product documentation/knowledge package
- UR-AGA-17 – Gross Primary Production product communication channels

Priority
High

Stability
stable.

Affected/Used GEOSS Platform Components
GEO DAB, GEOSS Portal

3.14. SR-FUN-014 – Support Sentinel Product Coverage

Identifier
SR-FUN-014

Title
Support Sentinel Product Coverage

Requirement Description
The GEOSS Platform shall enable the discovery of the set of Sentinel Products covering a user-selected area of interest.

Source scenarios
S2 Service Use

Linked User Requirements

- UR-JRC-07: GEO DAB Sentinel Products Coverage query
- UR-JRC-08: GWP enhancements for input selection

Priority
High

Stability
stable.

Affected/Used GEOSS Platform Components
GEO DAB, GEOSS Portal

3.15. SR-FUN-015 – Support ML models

Identifier
SR-FUN-015

Title
Support ML models

Requirement Description
The GEOSS Platform shall support the use of ML models for the calculation of relevant variables/indicators..

Source scenarios
S2 Service Use

Linked User Requirements
- UR-JRC-06: Support of multiple AGB ML models in VLab
- UR-JRC-09: GEOSS Portal enhancements for ML models
- UR-JRC-10: GEOSS Portal dashboard for AGB maps

Priority
High

Stability
stable.

Affected/Used GEOSS Platform Components
VLab, GEOSS Portal

3.16. SR-FUN-016 – AI-Powered Data Discovery and Access

Identifier
SR-FUN-016

Title
AI-Powered Data Discovery and Access

Requirement Description
The AI system shall be able to process natural language queries, understands the context, and suggests relevant datasets, along with download instructions and related datasets. For the purpose of the Proof of Concept the dynamic API integration with GEO Discovery and Access Broker (GEO DAB) will be evaluated to retrieve the data queried by a user.
The AI PoC will operate independently, without integration with existing GEOSS Platform components such as the GEOSS Portal.

Source scenarios
- S1: Resources discovery and access with linked information (relationships)

Linked User Requirements
- UR-AIP-01: Natural Language Query Processing
- UR-AIP-02: Relevant Dataset Suggestions
- UR-AIP-03: Download Instructions

- UR-AIP-04: Related Dataset Recommendations
- UR-AIP-05 – User Interface for AI-Powered Search
- UR-AIP-06 – Security and Privacy

Priority
High

Stability
Stable

Affected/Used GEOSS Platform Components
- AI Search Engine
- User Interface
- Data Repositories

Proof of Concept Disclaimer
This project is a proof of concept, which means its primary aim is to test the feasibility and practicality of AI-powered data discovery and access. The outcomes might vary, and it is possible that we may not achieve the desired goals. The results of this PoC will guide further development and potential implementation.

3.17. SR-FUN-017 – GEOSS Portal Landing Page

Identifier
SR-FUN-017

Title

Enhanced User Awareness and Engagement through a Landing Page

Requirement Description
The landing page shall serve as a gateway to the GEOSS Portal, offering a clear and structured layout that highlights the platform's features and benefits. It provides educational content to enhance user understanding and directs users to practical use cases, encouraging active participation and engagement with the GEO community.

Source scenarios
- S4: Promotion and collaboration.

Linked User Requirements
- UR-LPG-01: Structured Layout
- UR-LPG-02: Direct Navigation
- UR-LPG-03: SEO Optimization
- UR-LPG-04: Analytics Integration
- UR-LPG-05: Article Management
- UR-LPG-06: Cookie Notice

Priority
High

Stability
Stable

Affected/Used Components
- GEOSS Portal
- Matomo Analytics
- Admin Console for Article Management
- SEO Tools and Schema Implementation

3.18. SR-NFC-001 – Configurability of search domain

Identifier
SR-NFC-001

Title
Configurability of search domain

Requirement Description
The GEOSS Platform shall enable the configuration of specific “views” of the GEOSS Search domain, i.e. to tailor the search domain to the specific needs of specific communities., according to configurable community-defined keywords.

Source scenarios
S6 Exploiting discovery and access capabilities

Linked User Requirements
- UR-AFG-02 - The AfriGEOSS search keywords
- UR-AFG-03 - The AfriGEOSS Region of Interest
- UR-AFG-04 – The AfriGEOSS search domain
- UR-CSP-03 – Views Selection
- UR-CSP- 04 - Views Setup

Priority
High

Stability
Stable

Affected/Used GEOSS Platform Components
GEOSS View

3.19. SR-NFC-002 – Portal Customizability

Identifier
SR-NFC-002

Title
Portal Customizability

Affected/Used GEOSS Platform Components
GEO DAB, GEOSS Portal

Requirement Description
The GEOSS Platform shall enable customizability of the GEOSS Portal for the specific needs of different communities. See *linked requirements* below for details.

Source scenarios
S6 Exploiting discovery and access capabilities

Linked user requirements
- UR-AFG-01 - A dedicated portal for the AfriGEOSS community
- UR-AFG-05 - The AfriGEOSS filtering capabilities
- UR-CSP-01 – Community Portal package access
- UR-CSP-02 – Community Portal General Configuration
- UR-CSP-05 - Request to link a Community Portal
- UR-CSP-06 – Community Portal information
- UR-CSP-07 – Administration rights
- UR-CSP-08 – Linking a Community Portal

Priority
High

Stability
Stable, in so far as the corresponding user requirements are stable. See D2.1.

Affected/Used GEOSS Platform Components
GEOSS View, GEOSS Mirror, ad-hoc functional enhancements

6. Requirements traceability

4.1. System required capabilities vs User requirements

#	Code	Title	Linked User Requirements
1.	SR-FUN-001	Yellow Pages Management	UR-YPG-01- Graphic Banner UR-YPG-02- Wizard Registration UR-YPG-03- Terms of Service Acceptance UR-YPG-04- User Notifications UR-YPG-05- Data Modification\Deletion UR-YPG-06 – Data Provider Account Request UR-YPG-07- Search and Visualization of Registered Data Providers UR-YPG-08- Widget download UR-YPG-09- Widget Installation UR-YPG-10 – Yellow Pages Authorization UR-YPG-11 – Yellow Pages Authorization Response UR-YPG-12 – Data Modification UR-YPG-13 – Data Provider Account Management UR-YPG-14 – Data Provider Registration Process Status
2.	SR-FUN-002	Community Portal	UR-CSP-01 – Community Portal package access UR-CSP-02 – Community Portal General Configuration UR-CSP-03 – Views Selection UR-CSP- 04 - Views Setup UR-CSP-05 - Request to link a Community Portal UR-CSP-06 – Community Portal information UR-CSP-07 – Administration rights UR-CSP-08 – Linking a Community Portal
3.	SR-FUN-003	SDG – 15.3.1 Dashboard	UR-LDG-01 – SDG indicator 15.3.1 computation service discovery UR-LDG-02 – SDG indicator 15.3.1 computation service execution UR-LDG-03 – Visual representation of SDG indicator 15.3.1 computations UR-LDG-04 – My Workspace Dashboard UR-LDG-05- Acceptance of the visualizations
4.	SR-FUN-004	Data Discovery (with relationships to associated concepts)	UR-EIF-01 – Discovery of Eiffel Pilot 3 data UR-EIF-03 – Discovery of Eiffel Pilot 4 data UR-ATL-01 – Discovery and Access to the EMODnet Marine Physics Datasets UR-MEB-01 – Discovery and Access to the Ospar Data UR-MEB-02 – Discovery and Access to the Ospar Intermediate Assessment UR-MEB-03 – Discovery and Access to the EMODnet Biology UR-MEB-04 – Discovery and Access to the EMODnet Biology - non-indigenous species UR-MEB-05 – Discovery and Access to the Joint Copernicus Marine – tracking whales' data UR-MEB-06 – Discovery and Access to the Soft Corals Article UR-MEB-07 – Discovery and Access to the Ecosystem Services Article UR-MAC-01 – Discovery and Access to the EMODnet Chemistry, EU baseline UR-MAC-02 – Discovery and Access to the EMODnet Chemistry, Marine Litter UR-CCP-02 - Norovirus epidemiologic data

			UR-CCP-03 – IPCC scenarios data UR-CCP-04 – Species Distribution data UR-GSA-02 – GSA (Green Space Accessibility) data UR-MPS-05 – Discovery, access and inspection of WorldCereal or AGROSTAC harmonized in-situ reference data UR-AGA-01 – Gross Primary Production product discovery UR-AGA-02 – Gross Primary Production product visualization UR-AGA-03 – Gross Primary Production training materials discovery UR-AGA-04 – Gross Primary Production computation service execution UR-AGA-05 – Gross Primary Production product specification/definition UR-AGA-06 – Gross Primary Production product support/feedback UR-HAR-01 – Discovery of Harmonia data on urban heat fluxes and heat emissions
5.	SR-FUN-005	Service Discovery (with relationships to associated concepts)	UR-LDG-01 – SDG indicator 15.3.1 computation service discovery UR-EIF-03 – Discovery of Eiffel Pilot 4 data UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services UR-CCP-01 - Norovirus Risk Maps Model based on ecological niches UR-MPS-06 – Crop map UR-MPS-07 – Access and trigger WorldCereal processing module UR-MPS-08 – Visualization of crop map and saving in personal workspace UR-AGA-04 – Gross Primary Production computation service execution
6.	SR-FUN-006	Information Discovery (with relationships to associated concepts)	UR-LDG-05- Acceptance of the visualizations UR-AFG-06 - Accessing data, information and knowledge from AfriGEOSS UR-ATL-01 – Discovery and Access to the EMODnet Marine Physics Datasets UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service UR-MEB-01 – Discovery and Access to the Ospar Data UR-MEB-02 – Discovery and Access to the Ospar Intermediate Assessment UR-MEB-03 – Discovery and Access to the EMODnet Biology UR-MEB-04 – Discovery and Access to the EMODnet Biology - non-indigenous species UR-MEB-05 – Discovery and Access to the Joint Copernicus Marine – tracking whales' data UR-MEB-06 – Discovery and Access to the Soft Corals Article UR-MEB-07 – Discovery and Access to the Ecosystem Services Article UR-MAC-01 – Discovery and Access to the EMODnet Chemistry, EU baseline UR-MAC-02 – Discovery and Access to the EMODnet

			Chemistry, Marine Litter UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services UR-EIF-01 – Discovery of Eiffel Pilot 3 data UR-EIF-03 – Discovery of Eiffel Pilot 4 data UR-MPS-02 – Register WorldCereal in-situ data and guidelines UR-MPS-04 – Thematic area "in-situ data crop" UR-MPS-08 – Visualization of crop map and saving in personal workspace UR-LDG-01 – SDG indicator 15.3.1 computation service discovery UR-EIF-03 – Discovery of Eiffel Pilot 4 data UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services UR-CCP-01 - Norovirus Risk Maps Model based on ecological niches UR-MPS-06 – Crop map UR-MPS-07 – Access and trigger WorldCereal processing module UR-MPS-08 – Visualization of crop map and saving in personal workspace UR-AGA-04 – Gross Primary Production computation service execution
7.	SR-FUN-007	Inspection of search results	UR-LDG-01 – SDG indicator 15.3.1 computation service discovery UR-LDG-04 – My Workspace Dashboard UR-LDG-05- Acceptance of the visualizations UR-EIF-01 – Discovery of Eiffel Pilot 3 data UR-EIF-02 – Access and visualization of Eiffel Pilot 3 data UR-EIF-03 – Discovery of Eiffel Pilot 4 data UR-EIF-04 – Access and visualization of Eiffel Pilot 4 data UR-AFG-06 - Accessing data, information and knowledge from AfriGEOSS UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service UR-MEB-01 – Discovery and Access to the Ospar Data UR-MEB-02 – Discovery and Access to the Ospar Intermediate Assessment UR-MEB-03 – Discovery and Access to the EMODnet Biology UR-MEB-04 – Discovery and Access to the EMODnet Biology - non-indigenous species UR-MEB-05 – Discovery and Access to the Joint Copernicus Marine – tracking whales' data UR-MEB-06 – Discovery and Access to the Soft Corals Article UR-MEB-07 – Discovery and Access to the Ecosystem Services Article UR-MAC-01 – Discovery and Access to the EMODnet Chemistry, EU baseline UR-MAC-02 – Discovery and Access to the EMODnet Chemistry, Marine Litter UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services

			UR-CCP-01 - Norovirus Risk Maps Model based on ecological niches UR-CCP-02 - Norovirus epidemiologic data UR-CCP-03 – IPCC scenarios data UR-CCP-04 – Species Distribution data UR-GSA-01 – Urban Green Spaces Accessibility Model UR-GSA-02 – GSA Data UR-MPS-02 – Register WorldCereal in-situ data and guidelines UR-MPS-05 – Discovery, access and inspection of WorldCereal or AGROSTAC harmonized in-situ reference data UR-MPS-08 – Visualization of crop map and saving in personal workspace UR-AGA-02 – Gross Primary Production product visualization UR-AGA-03 – Gross Primary Production training materials discovery UR-AGA-08 – Gross Primary Production product documentation UR-AGA-09 – Gross Primary Production training materials discovery UR-AGA-10 – Gross Primary Production product Metadata UR-AGA-13 – Gross Primary Production Metadata specification and provision
8.	SR-FUN-008	Selection of search results	UR-LDG-01 – SDG indicator 15.3.1 computation service discovery UR-LDG-04 – My Workspace Dashboard UR-LDG-05- Acceptance of the visualizations UR-EIF-01 – Discovery of Eiffel Pilot 3 data UR-EIF-02 – Access and visualization of Eiffel Pilot 3 data UR-EIF-03 – Discovery of Eiffel Pilot 4 data UR-EIF-04 – Access and visualization of Eiffel Pilot 4 data UR-AFG-06 - Accessing data, information and knowledge from AfriGEOSS UR-ATL-01 – Discovery and Access to the EMODnet Marine Physics Datasets UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service UR-MEB-01 – Discovery and Access to the Ospar Data UR-MEB-02 – Discovery and Access to the Ospar Intermediate Assessment UR-MEB-03 – Discovery and Access to the EMODnet Biology UR-MEB-04 – Discovery and Access to the EMODnet Biology - non-indigenous species UR-MEB-05 – Discovery and Access to the Joint Copernicus Marine – tracking whales' data UR-MEB-06 – Discovery and Access to the Soft Corals Article UR-MEB-07 – Discovery and Access to the Ecosystem Services Article UR-MAC-01 – Discovery and Access to the EMODnet Chemistry, EU baseline UR-MAC-02 – Discovery and Access to the EMODnet

			Chemistry, Marine Litter UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services UR-CCP-01 - Norovirus Risk Maps Model based on ecological niches UR-CCP-02 - Norovirus epidemiologic data UR-CCP-03 – IPCC scenarios data UR-CCP-04 – Species Distribution data UR-GSA-01 – Urban Green Spaces Accessibility Model UR-GSA-02 – GSA Data UR-MPS-02 - Register WorldCereal in-situ data guidelines UR-MPS-05 – Discovery, access and inspection of WorldCereal or AGROSTAC harmonized in-situ reference data UR-AGA-02 – Gross Primary Production product visualization UR-AGA-03 – Gross Primary Production training materials discovery UR-AGA-08 – Gross Primary Production product documentation UR-AGA-09 – Gross Primary Production training materials discovery UR-AGA-10 – Gross Primary Production product Metadata UR-AGA-13 – Gross Primary Production Metadata specification and provision
9.	SR-FUN-009	Access to selected resource	UR-LDG-01 – SDG indicator 15.3.1 computation service discovery UR-LDG-04 – My Workspace Dashboard UR-LDG-05- Acceptance of the visualizations UR-AFG-06 - Accessing data, information and knowledge from AfriGEOSS UR-EIF-02 – Access and visualization of Eiffel Pilot 3 data UR-EIF-04 – Access and visualization of Eiffel Pilot 4 data UR-ATL-01 – Discovery and Access to the EMODnet Marine Physics Datasets UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service UR-MEB-01 – Discovery and Access to the Ospar Data UR-MEB-02 – Discovery and Access to the Ospar Intermediate Assessment UR-MEB-03 – Discovery and Access to the EMODnet Biology UR-MEB-04 – Discovery and Access to the EMODnet Biology - non-indigenous species UR-MEB-05 – Discovery and Access to the Joint Copernicus Marine – tracking whales' data UR-MEB-06 – Discovery and Access to the Soft Corals Article UR-MEB-07 – Discovery and Access to the Ecosystem Services Article UR-MAC-01 – Discovery and Access to the EMODnet Chemistry, EU baseline UR-MAC-02 – Discovery and Access to the EMODnet

			Chemistry, Marine Litter UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services UR-CCP-01 - Norovirus Risk Maps Model based on ecological niches UR-CCP-02 - Norovirus epidemiologic data UR-CCP-03 – IPCC scenarios data UR-CCP-04 – Species Distribution data UR-GSA-01 – Urban Green Spaces Accessibility Model UR-GSA-02 – GSA Data UR-MPS-05 – Discovery, access and inspection of WorldCereal or AGROSTAC harmonized in-situ reference data UR-AGA-02 – Gross Primary Production product visualization UR-AGA-03 – Gross Primary Production training materials discovery UR-AGA-08 – Gross Primary Production product documentation UR-AGA-09 – Gross Primary Production training materials discovery UR-AGA-10 – Gross Primary Production product Metadata UR-AGA-13 – Gross Primary Production Metadata specification and provision UR-HAR-02 – Access and analysis of Harmonia data on urban heat fluxes and heat emissions
10.	SR-FUN-0010	Service Execution	UR-LDG-02 – SDG indicator 15.3.1 computation service execution UR-LDG-04 – My Workspace Dashboard UR-CCP-01 - Norovirus Risk Maps Model based on ecological niches UR-CCP-05 – GWP/VLab Enhancement UR-GSA-01 – Urban Green Spaces Accessibility Model UR-MPS-07 – Access and trigger WorldCereal processing module UR-AGA-04 – Gross Primary Production computation service execution (Note: For AGAME static provision of data products using computation services are implemented in the first iteration)
11.	SR-FUN-0011	Data Provision (Registration)	UR-EIF-02 – Access and visualization of Eiffel Pilot 3 data UR-EIF-04 – Access and visualization of Eiffel Pilot 4 data UR-ATL-01 – Discovery and Access to the EMODnet Marine Physics Datasets UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service UR-MEB-01 – Discovery and Access to the Ospar Data UR-MEB-02 – Discovery and Access to the Ospar Intermediate Assessment UR-MEB-03 – Discovery and Access to the EMODnet Biology UR-MEB-04 – Discovery and Access to the EMODnet Biology - non-indigenous species UR-MEB-05 – Discovery and Access to the Joint Copernicus Marine – tracking whales' data UR-MEB-06 – Discovery and Access to the Soft Corals

			Article UR-MEB-07 – Discovery and Access to the Ecosystem Services Article UR-MAC-01 – Discovery and Access to the EMODnet Chemistry, EU baseline UR-MAC-02 – Discovery and Access to the EMODnet Chemistry, Marine Litter UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services UR-CCP-02 - Norovirus epidemiologic data UR-CCP-03 – IPCC scenarios data UR-CCP-04 – Species Distribution data UR-GSA-01 – Urban Green Spaces Accessibility Model UR-GSA-02 – GSA Data UR-MPS-03 - Register in-situ data providers UR-AGA-07 – Gross Primary Production product /workflow integration into eLTER cyberinfrastructure UR-AGA-08 – Gross Primary Production product documentation UR-AGA-09 – Gross Primary Production training materials discovery UR-AGA-10 – Gross Primary Production product Metadata UR-AGA-11 – Gross Primary Production Product support/feedback UR-AGA-12 – Gross Primary Production product specification / definition UR-AGA-13 – Gross Primary Production Metadata specification and provision UR-AGA-14 – Gross Primary Production product API - data provision UR-AGA-15 – Gross Primary Production product documentation/knowledge package UR-AGA-16 – Gross Primary Production product quality check UR-AGA-17 – Gross Primary Production product communication channels UR-AGA-18 – Gross Primary Production product data policies
12.	SR-FUN-0012	Service Provision (Registration)	UR-LDG-01 – SDG indicator 15.3.1 computation service discovery UR-LDG-02 – SDG indicator 15.3.1 computation service execution UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services UR-EIF-03 – Discovery of Eiffel Pilot 4 data UR-CCP-01 - Norovirus Risk Maps Model based on ecological niches UR-GSA-01 – Urban Green Spaces Accessibility Model UR-MPS-06 – Crop map UR-MPS-07 – Access and trigger WorldCereal processing module UR-MPS-08 – Visualization of crop map and saving in personal workspace UR-AGA-04 – Gross Primary Production computation service execution (Note: AGAME workflow could be

			deployed in a cloud computing infrastructure such as VLabs to provide a computation service. AGAME Gross Primary Production computation services could be registered later in GEOSS platform based on metadata defined in the service definition model and allow the service to be discoverable in GEOSS Platform. The computation service will allow users to replicate AGAME Gross Primary Production products and extend the period of analysis for upcoming years when new satellite imagery from Sentinel-2 is available.)
13.	SR-FUN-013	Information Provision (Registration)	UR-LDG-03 – Visual representation of SDG indicator 15.3.1 computations UR-ATL-01 – Discovery and Access to the EMODnet Marine Physics Datasets UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service UR-MEB-01 – Discovery and Access to the Ospar Data UR-MEB-02 – Discovery and Access to the Ospar Intermediate Assessment UR-MEB-03 – Discovery and Access to the EMODnet Biology UR-MEB-04 – Discovery and Access to the EMODnet Biology - non-indigenous species UR-MEB-05 – Discovery and Access to the Joint Copernicus Marine – tracking whales' data UR-MEB-06 – Discovery and Access to the Soft Corals Article UR-MEB-07 – Discovery and Access to the Ecosystem Services Article UR-MAC-01 – Discovery and Access to the EMODnet Chemistry, EU baseline UR-MAC-02 – Discovery and Access to the EMODnet Chemistry, Marine Litter UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services UR-EIF-01 – Discovery of Eiffel Pilot 3 data UR-EIF-03 – Discovery of Eiffel Pilot 4 data UR-MPS-07 – Access and trigger WorldCereal processing module (register as package in GKH) UR-AGA-08 – Gross Primary Production product documentation UR-AGA-09 – Gross primary production training material discovery UR-AGA-15 – Gross Primary Production product documentation/knowledge package UR-AGA-17 – Gross Primary Production product communication channels
14.	SR-FUN-014	Support Sentinel Product Coverage	UR-JRC-07: GEO DAB Sentinel Products Coverage query UR-JRC-08: GWP enhancements for input selection
15.	SR-FUN-015	Support ML models	UR-JRC-06: Support of multiple AGB ML models in VLab UR-JRC-09: GEOSS Portal enhancements for ML models UR-JRC-10: GEOSS Portal dashboard for AGB maps
16.	SR-FUN-016	AI-Powered Data Discovery and Access	UR-AIP-01: Natural Language Query Processing UR-AIP-02: Relevant Dataset Suggestions UR-AIP-03: Download Instructions UR-AIP-04: Related Dataset Recommendations UR-AIP-05 – User Interface for AI-Powered Search

			UR-AIP-06 – Security and Privacy
17.	SR-FUN-017	GEOSS Portal Landing Page	UR-LP-01: Structured Layout UR-LP-02: Direct Navigation UR-LP-03: SEO Optimization UR-LP-04: Analytics Integration UR-LP-05: Article Management UR-LP-06: Cookie Notice
18.	SR-NFC-001	Configurability of search domain	UR-AFG-02 - The AfriGEOSS search keywords UR-AFG-03 - The AfriGEOSS Region of Interest UR-AFG-04 – The AfriGEOSS search domain UR-CSP-03 – Views Selection UR-CSP- 04 - Views Setup
19.	SR-NFC-002	Portal customizability	UR-AFG-01 - A dedicated portal for the AfriGEOSS community UR-AFG-05 - The AfriGEOSS filtering capabilities UR-CSP-01 – Community Portal package access UR-CSP-02 – Community Portal General Configuration UR-CSP-05 - Request to link a Community Portal UR-CSP-06 – Community Portal information UR-CSP-07 – Administration rights UR-CSP-08 – Linking a Community Portal

Table 2: System vs User Requirements Traceability

4.2. Scenarios vs system required capabilities

#	Code	Title	System Requirements
1.	S1	Resources discovery and access with linked information	SR-FUN-002 – Community Portal SR-FUN-003 – SDG - 15.3.1 Dashboard SR-FUN-004 – Data discovery (with relationships to associated concepts) SR-FUN-005 – Service Discovery (with relationships to associated concepts) SR-FUN-006 – Information Discovery (with relationships to associated concepts) SR-FUN-007 – Inspection of search results SR-FUN-008 – Selection of search results SR-FUN-009 – Access to selected resource SR-FUN-016 – AI-Powered Data Discovery and Access
2.	S2	Service Use	SR-FUN-003 – SDG - 15.3.1 Dashboard SR-FUN-010 – Service execution SR-FUN-014 – Support Sentinel Product Coverage SR-FUN-015 – Support ML models

3.	S3	Resources Registration	SR-FUN-003 – SDG - 15.3.1 Dashboard SR-FUN-011– Data provision (registration) SR-FUN-012 – Services provision (registration) SR-FUN-013 – Information provision (registration)
4.	S4	Promotion and collaboration.	SR-FUN-011– Data provision (registration) SR-FUN-012 – Services provision (registration) SR-FUN-013 – Information provision (registration) SR-FUN-017 – GEOSS Landing Page
5.	S5	Data providers (registration)	SR-FUN-001 – Yellow Pages Management
6.	S6	Exploiting discovery and access capabilities	SR-FUN-002 – Community Portal SR-FUN-003 – SDG - 15.3.1 Dashboard SR-NFC-001 – Configurability of search domain SR-NFC-002 – Portal Customizability
7.	S7	Discovering experiment results	SR-FUN-006 – Information Discovery (with relationships to associated concepts) SR-FUN-007 – Inspection of search results SR-FUN-008 – Selection of search results SR-FUN-009 – Access to selected resource SR-FUN-013 – Information provision (registration)
8.	S8	Reproducing an experiment	SR-FUN-006 – Information Discovery (with relationships to associated concepts) SR-FUN-007 – Inspection of search results SR-FUN-008 – Selection of search results SR-FUN-009 – Access to selected resource SR-FUN-010 – Service execution SR-FUN-013 – Information provision (registration)

9.	S9	Replicating an experiment	SR-FUN-003 – SDG - 15.3.1 Dashboard SR-FUN-004 – Data discovery (with relationships to associated concepts) SR-FUN-006 – Information Discovery (with relationships to associated concepts) SR-FUN-007 – Inspection of search results SR-FUN-008 – Selection of search results SR-FUN-009 – Access to selected resource SR-FUN-010 – Service execution SR-FUN-013 – Information provision (registration)
10.	S10	Reusing an experiment	SR-FUN-003 – SDG - 15.3.1 Dashboard SR-FUN-004 – Data discovery (with relationships to associated concepts) SR-FUN-005 – Service Discovery (with relationships to associated concepts) SR-FUN-006 – Information Discovery (with relationships to associated concepts) SR-FUN-007 – Inspection of search results SR-FUN-008 – Selection of search results SR-FUN-009 – Access to selected resource SR-FUN-010 – Service execution SR-FUN-013 – Information provision (registration)

Table 3: Scenarios vs System Requirements Traceability

Annex A. References

[RD-1] GPP-DEL-WP2-D2.1-v1.0 Use Cases Description and User Requirements Document v1

[RD-2] GPP-DEL-WP2-D2.3-v1.0 Use Cases Description and User Requirements Document v2

[RD-3] GPP-DEL-WP2-D2.5-v1.0 Use Cases Description and User Requirements Document v3

[RD-4] GPP-DEL-WP2-D2.2-v1.0 Functional and non-functional enhancements specification v1

[RD-5] GPP-DEL-WP2-D2.4-v1.0 Functional and non-functional enhancements specification v2

[RD-6] EIFFEL – GEOSS Applications for Climate Change EIFFEL - Home (eiffel4climate.eu)

[RD-7] Harmonia - Development of a Support System for Improved Resilience and Sustainable Urban areas to cope with Climate Change and Extreme Events Home - Harmonia (harmonia-project.eu)

[RD-8] European Marine Observation and Data Network (EMODnet) - Home | European Marine Observation and Data Network (EMODnet) (europa.eu)

Annex B. Figures and Tables

B.1 List of Figures

B.2 List of Tables

Annex C. Terminology

C.1 Acronyms and Abbreviations

CNR-IIA	Consiglio Nazionale delle Ricerche – Istituto per l'Inquinamento Atmosferico
EC	European Commission
EO	Earth Observation
EOP	Earth Observation Programme
ESA	European Space Agency
EU	European Union
GEO	Group on Earth Observation
GEO DAB	GEO Discovery and Access Broker
GEOSS	Global Earth Observation System of Systems
GPP	GEOSS Platform Plus
GSA	Green Spaces Accessibility
H2020	Horizon 2020
MOM	Minutes of Meeting
PQMP	Project Quality Management Plan
QA	Quality Assurance
SDG	Sustainable Development Goal
VLAB	Virtual Laboratory
WBS	Work Breakdown Structure
WGISS	Working Group on Information Systems and Services
WP	Work Package
WPL	Work Package Leader
GPP	Gross Primary Production
AGB	Above Ground Biomass
GKH	GEO Knowledge Hub
YP	Yellow Pages
GDPR	General Data Protection Regulation
PoC	Proof of Concept
GWP	GEO Web Portal
eLTER	integrated european Long-Term Ecosystem, critical zone and socio-ecological Research