

Report on Methodologies for Measuring GEOSS Platform Usage and User Satisfaction

This document is submitted by the GEOSS Platform Operations Team to the Programme Board for discussion.

1 INTRODUCTION

1.1 Document purpose and scope

This document aims at responding to the GEO Programme Board Action 20-03: *GEOSS Platform team to prepare, in consultation with the GIDTT and other stakeholders, a list of proposed metrics of usage of the GEOSS Platform, including of the extent to which GEOSS Portal searches yield useful results and of user satisfaction. Due: PB-21.*

The document refers to the current architecture and implementation of the GEOSS Platform. Any change resulting from the transition to the new architecture of GEOSS under discussion in the GIDTT will likely have an impact on the requirements and solutions for monitoring GEOSS usage and user satisfaction.

1.2 Document structure

The document is structured as follows:

- **Section 1 - Introduction:** describes the purpose of the document and its structure;
- **Section 2 - GEOSS Platform overview:** provides a brief overview of the Platform, its main objective, user categories, functionalities, and components;
- **Section 3 - Assessment Objectives, Approach and Methodology:** describes the objectives of the assessment and the methodology proposed for measuring progress towards those objectives;
- **Section 4 - Assessment instruments:** describes the instruments (including type of metrics and surveys) used for the assessment, mapped to the different functionalities (and corresponding user categories);
- **Section 5 - Current status and plans:** describes what has been and is being done for the assessment of the Platform and what is envisaged for the future;
- Annex A - GEOSS Platform metrics (currently used and under discussion);
- Annex B - Surveys.

2 GEOSS PLATFORM OVERVIEW

The GEOSS Platform, by enabling the connection and coordination of the many autonomous and multi-organizational systems and services contributing to GEOSS, is the technological tool implementing the Global Earth Observation System of Systems (GEOSS).

The main objective of the GEOSS Platform is to serve the needs of diverse user communities and categories, while keeping their experience smooth and friendly.

User communities include:

- Representatives from the following thematic areas: Disaster Resilience Management (which is a GEO Priority Area), Water Resources Management, Biodiversity and Ecosystem Sustainability, Public Health Surveillance, Agriculture and Food Security, Sustainable Urban Development, Climate (another GEO Priority Area);
- GEO regional Hubs such as AmeriGEO, EuroGEO and AOGEO;
- Communities linked to the Sustainable Development Goals (another GEO Priority Area);
- Communities linked to the GEO flagships and initiatives;
- Cross-thematic communities.

The following main user categories with corresponding functionalities, have been identified:

- Resource providers: interested in sharing their resources (mostly data at the moment) with users;
- Decision and policy makers: interested in easily finding ready-to-use, actionable information;
- Application developers (including value adders): interested in applications development, interfacing, or integrating available capabilities in their own infrastructures;
- Data or application scientists and researchers: interested in easily discovering, accessing, and using data from heterogeneous sources;
- Citizens: interested in accessing general purpose, including map-based, information through mobile devices.

The current implementation of the GEOSS Platform consists of four main components, namely:

- The **GEO Discovery and Access Broker** (GEO DAB): implementing the necessary mediation and harmonization services enabling providers to share their resources;
- The **GEOSS Portal** (www.geoportal.org): the online map-based user interface enabling users to discover and access Earth observations from different providers;
- The **GEOSS Yellow Pages**: implementing the simplified registration process for new resource providers.
- The **GEOSS Service Status Checker**: interfaced by the GEO DAB, providing information regarding the accessibility of the resources.

3 ASSESSMENT OBJECTIVES, APPROACH, AND METHODOLOGY

The GEOSS Platform assessment methodology is designed to:

- Objective 1 (OBJ1): Assess the usage of the GEOSS Platform; and
- Objective 2 (OBJ2): Assess the extent to which GEOSS Platform searches yield useful results and of user satisfaction.

Usage scenarios strongly depend on the user categories and communities. Consequently, different user categories and different user communities may provide different evaluations of the GEOSS Platform. Then, usage and satisfaction must be assessed with reference to them. This is specifically important also in light of the planned evolution towards a digital ecosystem.

Specifically, the focus of the assessment is on the satisfaction of the user categories and communities with respect to the functionalities they use and with respect to the user experience with the Platform. Also, the awareness of the Platform in the web is assessed as a measure of its uptake potential by other user communities and categories.

The assessment methodology adopted by the GEOSS Platform team consists of extraction of usage statistics for Objective 1 and the integration of direct and indirect measures for Objective 2.

Direct actions consist in the consultation of the various user categories and communities to collect information about their usage of the GEOSS Platform and their satisfaction, also identifying existing barriers (lack of data, data quality, user friendliness, etc.). Direct actions include:

- Meetings with representatives of Flagships and Initiatives to collect users' perception about the current GEOSS Platform value, and identification of limitations and barriers (lack of data, data quality, user friendliness, etc.). This action requires a direct involvement of the GEO Secretariat to act as a liaison between the GEOSS Platform Team and GEO Flagship and Initiatives.
- Surveys (see User Surveys) filled by final users (through the GEOSS Portal), by providers (after the brokering process), by user communities adopting one or more of the GEOSS Platform functionalities.

Direct actions will build upon supporting the elicitation and implementation of user scenarios and surveying activities, as well as upon the recently started interaction between the GEOSS Platform Team and GEO Flagships and Initiatives.

Indirect actions consist in:

- Collection of usage statistics from the different components of the GEOSS Platform, namely the GEO DAB (machine-to-machine interaction) and the GEOSS Portal (human-to-machine interaction).
- Information extraction from statistics raw data to elicit user categories, most requested data, access trends, etc.

Indirect actions build upon the existing usage collection statistics from the GEOSS Platform and the previous experiences in information extraction (Craglia et al., 2017).

4 ASSESSMENT INSTRUMENTS VS FUNCTIONALITIES AND USER CATEGORIES

Table 1 provides a description of the main GEOSS Platform capabilities used by each user category and a summary of the instruments devised for assessing the satisfaction of the user with respect to those functionalities.

Table 1: Assessment Instruments by User Category

User category	Functionality	Assessment instruments
Resource Providers	Resource sharing	<p>Metrics to assess the effectiveness of the resource sharing through GEOSS by quantifying the usage of the specific provider's resources</p> <p>Survey to assess the satisfaction of the provider with the resource registration process</p>

User category	Functionality	Assessment instruments
Decision and Policy makers	Discovery of information relevant for policy topics, e.g. the GEO engagement priorities, a specific Sustainable Development Goal (SDG), etc.	<p>Metrics to assess the availability of policy-relevant information (this mostly depends on the provider)</p> <p>Metrics to assess the findability of this information (when available)</p> <p>Metrics to assess the usability of the User Interface</p> <p>Surveys to assess the satisfaction of this user category with the provided data and functions</p>
Application developers	Exploitation of GEOSS capabilities and resources in/from community infrastructure, via community portals, machine to machine interface, widgets, etc.	<p>Metrics to assess the uptake by different communities</p> <p>Surveys to assess the satisfaction of the developers with the process of integration in their own infrastructure of the GEOSS Platform capabilities.</p>
Data or application Scientists and Researchers	Discovery and use of data and services relevant for scientific domains.	<p>Metrics to assess the availability of such data and services (this mostly depends on the provider)</p> <p>Metrics to assess the usability of the Platform for making use of such data and services</p> <p>Surveys to assess the satisfaction of this user category with the provided data and functions</p>
Citizens	Access to general purpose information through mobile devices.	<p>Metrics to assess the availability of information of interest (this mostly depends on the provider)</p> <p>Metrics to assess the accessibility of the platform through different devices</p> <p>Surveys to assess the satisfaction of this user category with the provided data and functions</p>

5 STATUS AND PLANS

The current implementation of the GEOSS Platform already performs some activities for monitoring and assessment of usage and user satisfaction according to indirect and direct actions.

Concerning indirect actions, the GEOSS Platform Operations Team continuously collects usage statistics from the GEOSS Platform components (for both human-to-machine interactions and machine-to-machine interaction). In particular, the DAB statistic collection system was redesigned and reengineered in 2019. A valuable activity on the information extraction from

statistics raw data was carried out by the Joint Research Centre of the European Commission that conducted an analysis of the GEO DAB raw data for the years 2016/2017 to determine the user distribution by country and type. A similar study was recently funded to repeat and enhance the previous one to post-2017 data.

Regarding direct actions, the current implementation of the GEOSS Platform enables users to explicitly provide their feedback on the portal by simply clicking on a mood icon and on the specific resources by clicking on the GEOSS like. Users willing to spend a little more time on providing constructive feedback, can fill out a feedback form and reply to a user satisfaction survey. They can also send an email to the provided support contact address to signal any issues or provide suggestions. Any issues or problems signalled by the users are collected by a ticketing system and analysed by the GEOSS Platform team if they concern the Platform or forwarded to the Resource provider if they are related to a specific resource.

Additional explicit feedback is collected via interactions with GEO Flagships and Initiatives, along with the Data Sharing Team with the facilitation of the GEO Secretariat.

User feedback is also implicitly derived by the analysis of the usage statistics of the various GEOSS Platform components. Also in this case, any identified issues, malfunctions or relevant recommendations for improvement are addressed to the GEOSS Platform team or to the Resource provider.

Future plans to improve the assessment of usage and user satisfaction include:

- Co-design of main indicators on GEOSS Platform usage and user satisfaction. The definition of indicators should involve the GEO Secretariat as a main stakeholder and target categories represented by the GEO Communities to clarify which kind of feedback on usage is specifically and mostly required, and the GIDTT to evaluate technical feasibility and also keep the activity aligned with the planned evolution of GEOSS. The performance of the GEOSS Platform in terms of usage and user satisfaction is currently summarized through a set of Key Performance Indicators (KPIs) (see Annex A). This set is expected to be enlarged in the future for a more in depth assessment of the progress towards the identified objectives. Additional metrics, not yet implemented, but expected to be considered in the future, are reported in Annex A as well. Other metrics are expected to be co-designed with GEO and take into account the envisaged evolution of GEOSS.
- Joint GEO activities between GPOT (and GIDTT) and Flagships, Initiatives, other relevant working groups, with facilitation by GEO Secretariat, taking as example the activity between GPOT and GEO Data Sharing Working Group leading to the GEO Work Programme Activities Data Analysis
- Extremely important, for the future, will be the re-establishment of the GEOSS Data Provider and User Workshops and the interactions with the GEO Flagships and Initiatives, coordinated by the GEO Secretariat. Moreover, surveys addressed to different user categories (final users and applications developers) have been and will be defined and used (see Annex B).
- Analysis of raw statistics. The EC JRC is conducting an analysis of the GEO DAB raw usage data for the last years (after 2017) to investigate how the usage evolved over the years.

6 REFERENCES

M. Craglia, J. Hradec, S. Nativi, M. Santoro, 2017, Exploring the depths of the global earth observation system of systems, Big Earth Data, pp. 1-26, doi: 10.1080/20964471.2017.1401284

PB-20-09, Report on Usage of the GEOSS Platform

Annex A: GEOSS Platform Metrics (current and under discussion)

OBJ ₁	Currently implemented
	Average number of downloaded/accessed resources per day.
	Number of visits per week.
	Number of users by country.
	Number of different user communities served.
	Percentage of accesses from mobile devices (number of accesses from mobile devices over the number of total accesses).
	Number of GEO flagships or initiatives using the GEOSS Platform as main data discovery and access tool.
	Number of searches through search engines: looking at the number of people who are searching for GEOSS on search engines provides insight into its awareness. The measure is compiled by analysing how many organic search visits land on the GEOSS Portal pages.
	Number of mentions: this measure provides insight into how many online references are made to discovery, access and/or use of GEO resources via GEOSS in sources like social media, 3rd party websites and blogs.
	Number of active users (i.e. users returning to the portal at least twice during the reporting period).
	GEOSS Portal availability.
	Number of GEOSS resources providers.
	Number of GEOSS resources.
	Under discussion
	Number of (registered) users per user category: at the time of this writing, the category to which the user belongs is not requested in the user registration form.
Currently implemented	
Rate of positive user feedbacks, i.e. number of positive user feedbacks divided by the total number of user feedbacks. (In relation to this indicator, as well the number of feedbacks after a visit with respect to the number of visits is monitored.): this along, with the rate of negative user feedbacks and the number of active users (see above) provides valuable insights into to what extent users appreciate the Platform.	
SUS (System Usability Scale) score	
Average resolution time as regards issues that affect the users directly: it is particularly important to keep this low, to prevent rapid user disaffection.	

OBJ₂	<p>The number of Data Providers fulfilling the data sharing and management principles: an example of a KPI not used to assess the performance of the Platform, but still useful to monitor the uptake of the GEO principles.</p>
	<p>Under discussion</p>
	<p>Task (query, download, etc.) success rate, measured as the number of the correctly completed tasks over the number of total attempts. Task success rate progress over time also gives an understanding of system’s learnability, which is another indicator of user experience success.</p>
	<p>Time on task, i.e. the amount of time it takes the user to complete the task, expressed in minutes and seconds. The average time spent on each task (query, download, etc.) shall be monitored.</p>
	<p>User error rate, i.e. the total number of errors across all users divided by the total number of error opportunities (i.e., given a task, the identified places in the interface where users can make mistakes, multiplied by the number of users attempting the task).</p>
	<p>Number of resources providers contributing to each GEO Priority area.</p>
	<p>Number of resources per SDG goal/indicator/target.</p>
	<p>Number of SDG goal/target/indicator for which useful GEOSS resources are available.</p>

Annex B: Surveys

FINAL USER SURVEY

The final user is asked to reply to the following questions:

1. What is your general impression of the portal?
2. Did you find what you were looking for?
3. What were you looking for?
4. How would you describe your interest as an Earth observation user:
 - Global - world-wide interest
 - National - Country-specific interest
 - Regional - specific geographic interests within a Country
 - Local - Community-specific geographic interests
 - Other “ ”
5. How would you classify yourself professionally:
 - Scientist/Researcher
 - Decision Support official
 - Policy Analyst
 - Other " "
6. How strongly do you agree with the following statement?
"I find the Portal site content logically organized"
7. How strongly do you agree with the following statement?
"I think that the information offered on the site is adequately described"
8. Are there any other search criteria that would be helpful to you?
9. Are there any visualizations of data that might help you better understand what can be derived from the Portal?

APPLICATION DEVELOPERS SURVEY

The communities adopting the GEOSS Platform reusable solutions, provided their impressions on their experience in the usage of the GEOSS platform and in the activities of integrating and interfacing the GEOSS platform tools and resources.

1. Integration/interfacing GEOSS platform tools/resources
How do you rate (Excellent, Good, Satisfactory, Poor, Comments) the easiness of integration/interfacing the GEOSS platform tools/instruments such as:
 - GEOSS Widget
 - GEOSS Mirror
 - GEOSS API

- GEOSS View
- Others (please specify)

How do you rate (Excellent, Good, Satisfactory, Poor, Comments) the implementation of your requirements in the GEOSS portal?

- Registration process
- In terms of content of the implementation (requirements fulfillment)
- In terms of quality of the implementation (user friendly interface, etc.)

2. GEOSS platform usage

How do you rate (Excellent, Good, Satisfactory, Poor, Comments) the GEOSS platform instruments responding to your requirements?

The available resources:

- Data
- Information
- Knowledge

The available functionalities:

- Type of available data
- Data discovery
- Data inspection
- Data access
- Data usage
- Information/knowledge extraction

3. Could you observe an increase of the data usage from your own portal? (Yes, No, Don't know, Comments)

- In terms of number of users
- In terms of data inspected
- In terms of volumes downloaded

4. Please provide suggestions for improvements.