GEO
Data and Knowledge and Infrastructure

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GEO Infrastructure coordinator

GROUP ON EARTH OBSERVATIONS

May 26th, 2025


We came from a long road

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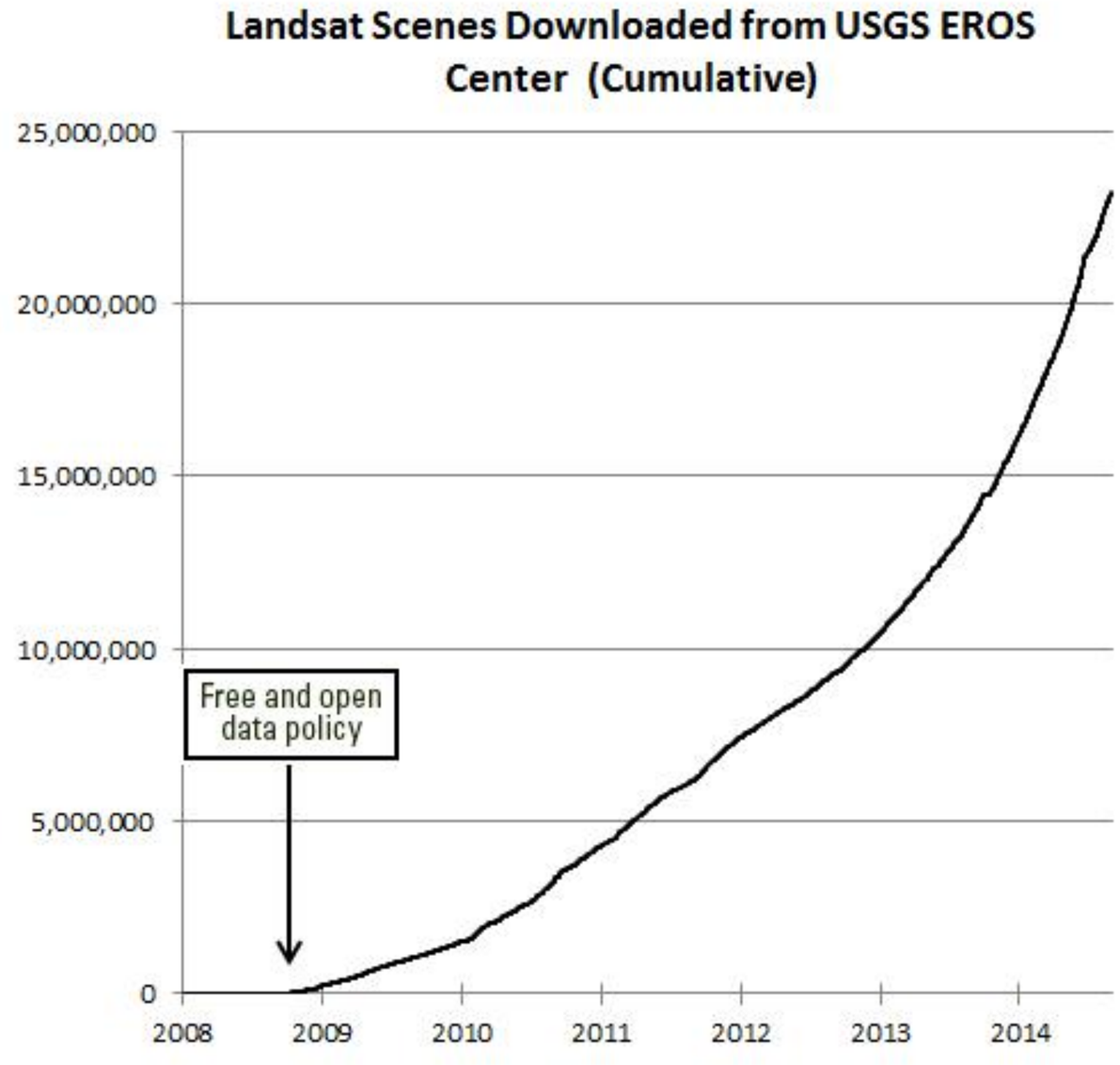
Data sharing principles

1. Data, metadata and products will be shared as **Open Data by default**, by making them available as part of the GEOSS Data Collection of Open Resources for Everyone (Data-CORE) without charge or restrictions on re-use, subject to the conditions of registration and attribution when the data are re-used

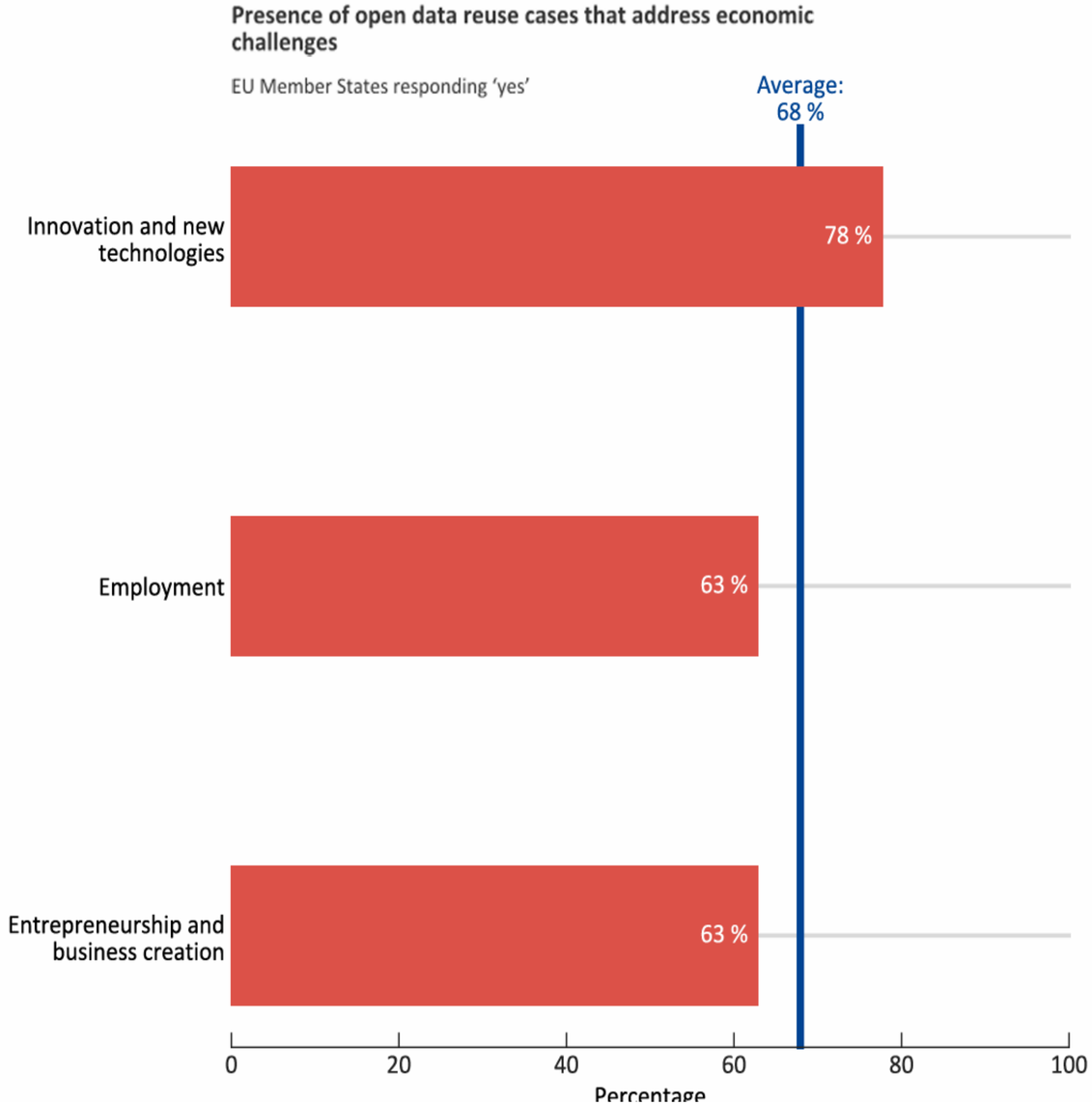
2. Where international instruments, national policies or legislation preclude the sharing of data as Open Data, data should be made available with minimal restrictions on use and at no more than the cost of reproduction and distribution

3. All shared data, products and metadata will be made available with minimum time delay

[Landsat Seen as Stunning Return on Public Investment | Landsat Science]



European Open Data Maturity Report
[odm2023_report.pdf]



Landsat
ECONOMIC VALUATION
2023

DIRECT VALUE
$25B
Economic Benefits to Direct Users

INDIRECT VALUE GENERATED

- **$255M** Discovery of Mineral Reserves
- **$583M** Scientific Publications
- **$41M** Patent Applications

INDIRECT COST SAVED

- **$51M** Water Quality Monitoring
- **$20M** Unmetered Irrigation Wells
- **$90M** Shoreline Mapping
- **$100M** Crop Insurance Fraud Reduction
- **$300M** Lower Crop Flood Insurance Rates
- **$100M** Updating Global Maps
- **$2-9M** Wildfire Restoration
- **$4M** Monitoring Eucalyptus Tree Growth

Landsat Next Capabilities Will Improve User Applications

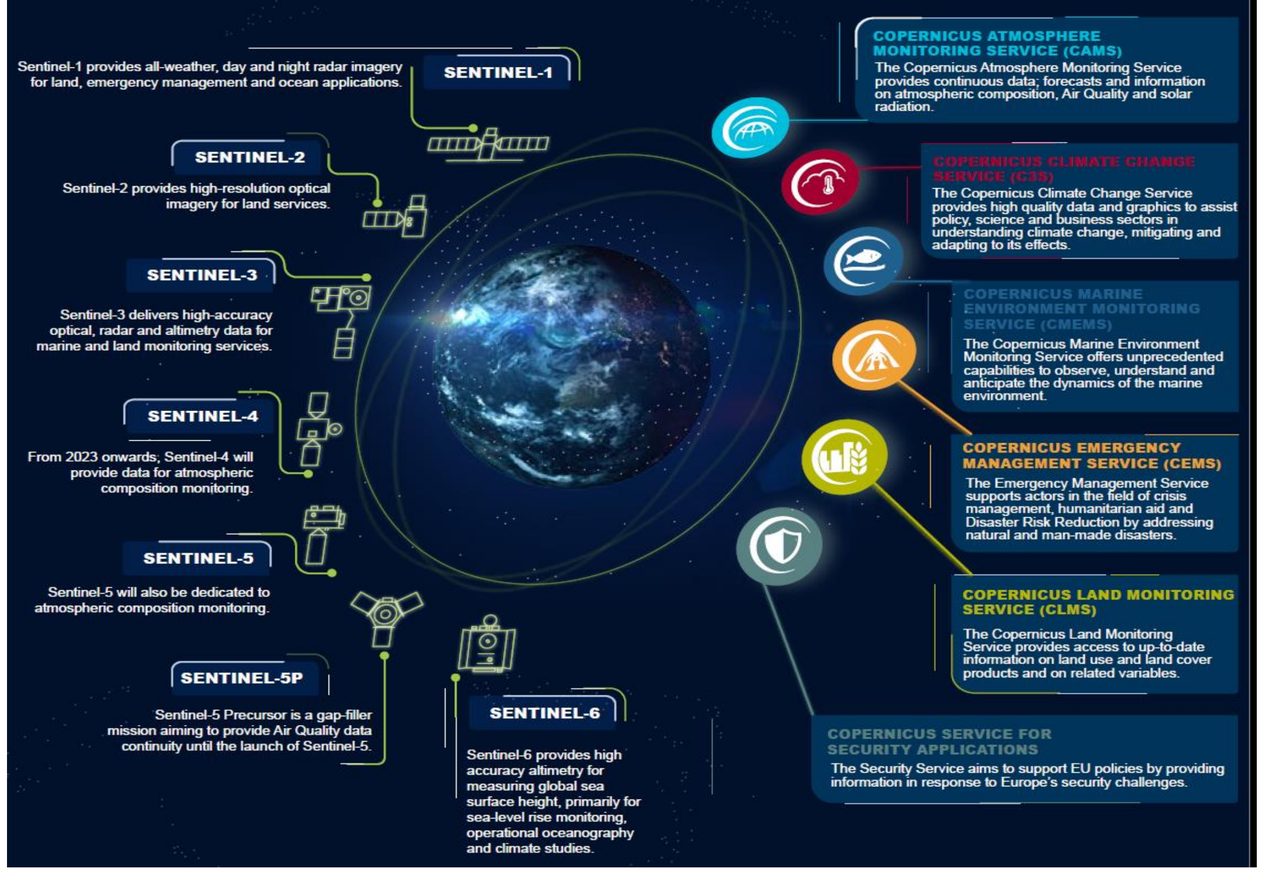
- Natural Disasters
- Biodiversity
- Agriculture
- Urban Planning
- Deforestation
- Coastline Shifting
- Snow/Ice Detection/ Clouds
- Water Quality and Management
- Atmospheric Pollutant Detection
- Wildfire
- Albedo Estimation

$33B Direct Value with Landsat Next (30% increase)

Legend

○ PUBLIC ● PRIVATE

M MILLION B BILLION



During the period 2017 – 2035, Copernicus is expected to generate €67 to €131 billion in benefits, which is 10 to 20 times the cost of the programme.

Copernicus-Ex-Ante-Final-Report_0_0.pdf

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Earth intelligence for all — GEO Symposium & ODOK Workshop — FROM VISION TO ACTION

GEO & other data management principles

- Discoverability
- Accessibility
- Encoding
- Documentation
- Provenance
- Quality Control
- Preservation
- GEO Ministerials
- Verification
- Review and processing
- Identifiers

2015

FAIR

2016

CARE

Collective Benefit · Authority to Control · Responsibility · Ethics

2018

TRUST

2020

The **D**ata and **K**nowledge **W**orking **G**roup (DK-WG) is convened to **work** with the GEO community and with external stakeholders to address **data policy**, **data sharing** and **data governance issues** impacting the use of space-based and in-situ EO as well as open knowledge practices

Subgroup: In-situ data

Fairification tool

G-reqs

Subgroup: Data Sharing and Data management principles

Self-assessment tool

Dialogue Series

Subgroup: Law and Policy

Survey on Data License

Engagement with GWP

The DK-WG co-organize the Open Data and Open Knowledge (**ODOK**) workshop

ODOK 2023 (Switzerland)

ODOK 2024 (China)

ODOK 2025 (Italy)

Data and Knowledge working group resources and tools

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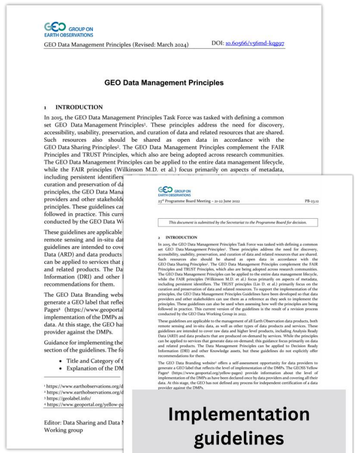
GEO Data Management Principles



GEO Data Management Principles (Revised: March 2024) DOI: 10.6084/m9.figshare.25444690.v2

GEO Data Management Principles

1 INTRODUCTION

In 2015, the GEO Data Management Principles Task Force was tasked with defining a common set GEO Data Management Principles[1]. These principles address the need for discovery, accessibility, usability, preservation, and curation of data and related resources that are shared. Such resources also should be shared as open data in accordance with the GEO Data Sharing Principles[2]. The GEO Data Management Principles complement the FAIR Principles and TRUST Principles, which also are being adopted across research communities. The GEO Data Management Principles can be applied to the entire data management lifecycle, while the FAIR principles (Wilkinson M.D. et al.) focus primarily on aspects of metadata, including persistent identifiers[3] and machine readability[4], and the TRUST principles[5] on curation and preservation of data and related resources. To support the implementation of the principles, the GEO Data Management Principles Guidelines have been developed so that data providers can easily understand how to apply the principles and how to demonstrate their principles. These guidelines can also be used when assessing how well the principles are being followed in practice. This current version of the guidelines is the result of a revision process coordinated by the GEO Data Working Group in 2022.

These guidelines are applicable to the management of all Earth Observation data products, both those produced directly by GEO and those produced by other organizations. In addition, the guidelines are intended to cover raw data and higher level products, including Analysis Ready Data (ARD) and data products that are produced on-demand by services. While the principles can be applied to Information and Knowledge products, this document focuses on data products and related products. The Data Management Principles can be applied to Decision Ready Information (DRI) and other Knowledge assets, but these guidelines do not explicitly offer recommendations for them.

The GEO Data Branding website[6] offers a self-assessment opportunity for data providers to demonstrate how well they are following the principles described here. The GEO "Yellow Pages" (https://www.geoportal.org/yellow-pages) provide information about the level of implementation of the DMPs as have been declared once by data providers and covering all their data. In addition, GEO has now defined any process for independent certification of a data provider against the DMPs.

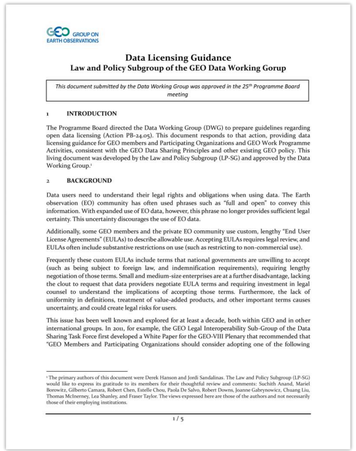
- Title and Category of d
- Explanation of the DM

[1] https://www.earthobservations.org/d
[2] https://www.earthobservations.org/d
[3] https://geoidadd.info/
[4] https://www.geoportal.org/yellow-pa

Editor: Data Sharing and Data M
Working group

Implementation guidelines

Data License Guidance



GEO GROUP ON EARTH OBSERVATIONS

Data Licensing Guidance
Law and Policy Subgroup of the GEO Data Working Gorup

This document submitted by the Data Working Group was approved in the 25th Programme Board meeting

1 INTRODUCTION

The Programme Board directed the Data Working Group (DWG) to prepare guidelines regarding open data licensing (Action PB-24.05). This document responds to that action, providing data licensing guidance for GEO members and Participating Organizations and GEO Work Programme Activities, consistent with the GEO Data Sharing Principles and other existing GEO policy. This living document was developed by the Law and Policy Subgroup (LP-SG) and approved by the Data Working Group.[1]

2 BACKGROUND

Data users need to understand their legal rights and obligations when using data. The Earth observation (EO) community has often used phrases such as "full and open" to convey this information. With expanded use of EO data, however, this phrase no longer provides sufficient legal certainty. This uncertainty discourages the use of EO data.

Additionally, some GEO members and the private EO community use custom, lengthy "End User License Agreements" (EULAs) to describe allowable use. Accepting EULAs requires legal review, and EULAs often include substantive restrictions on use (such as restricting to non-commercial use).

Frequently these custom EULAs include terms that national governments are unwilling to accept (such as being subject to foreign law, and indemnification requirements), requiring lengthy negotiation of those terms. Small and medium-size enterprises are at a further disadvantage, lacking the clout to request that data providers negotiate EULA terms and requiring investment in legal counsel to understand the implications of accepting those terms. Furthermore, the lack of uniformity in definitions, treatment of value-added products, and other important terms causes uncertainty, and could create legal risks for users.

This issue has been well known and explored for at least a decade, both within GEO and in other international groups. In 2015, for example, the GEO Legal Interoperability Sub-Group of the Data Sharing Task Force first developed a White Paper for the GEO-VIII Plenary that recommended that "GEO Members and Participating Organizations should consider adopting one of the following

[1] The primary authors of this document were Derek Hanson and Jordi Sandalinas. The Law and Policy Subgroup (LP-SG) would like to express its gratitude to its members for their thoughtful review and comments: Sachith Anand, Mariel Borowitz, Gilberto Camara, Robert Chen, Estelle Chen, Paola De Salvo, Robert Downs, Joanne Gabrynowicz, Chuang Liu, Thomas McInerney, Lea Shanley, and Fraser Taylor. The views expressed here are those of the authors and not necessarily those of their employing institutions.

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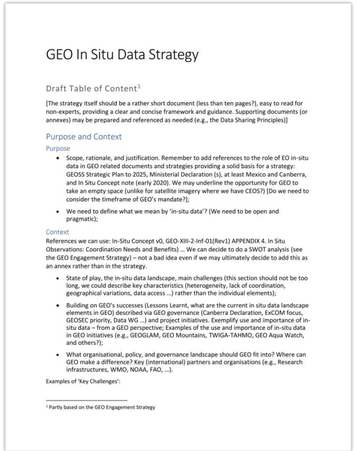
GEO In Situ Data Strategy



GEO In Situ Data Strategy

Draft Table of Content[1]

[The strategy itself should be a rather short document (less than ten pages?), easy to read for non-experts, providing a clear and concise framework and guidance. Supporting documents (or annexes) may be prepared and referenced as needed (e.g., the Data Sharing Principles)]

Purpose and Context

Purpose

- Scope, rationale, and justification. Remember to add references to the role of EO in-situ data in GEO related documents and strategies providing a solid basis for a strategy: GEOSS Strategic Plan to 2025, Ministerial Declaration (s), at least Mexico and Canberra, and In Situ Concept note (early 2020). We may underline the opportunity for GEO to take an empty space (unlike for satellite imagery where we have CEOS?) [Do we need to consider the timeframe of GEO's mandate?];
- We need to define what we mean by 'in-situ data'? [We need to be open and pragmatic];

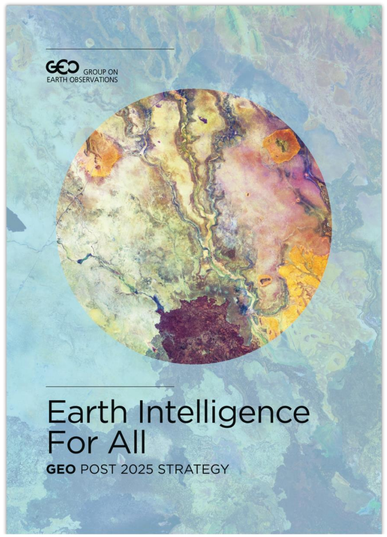
Context

References we can use: In-Situ Concept v0, GEO-XIII-2-Inf-01(Rev1) APPENDIX 4. In Situ Observations: Coordination Needs and Benefits) … We can decide to do a SWOT analysis (see the GEO Engagement Strategy) – not a bad idea even if we may ultimately decide to add this as an annex rather than in the strategy.

- State of play, the in-situ data landscape, main challenges (this section should not be too long, we could describe key characteristics (heterogeneity, lack of coordination, geographical variations, data access …) rather than the individual elements);
- Building on GEO's successes (Lessons Learnt, what are the current in situ data landscape elements in GEO) described via GEO governance (Canberra Declaration, ExCOM focus, GEOSEC priority, Data WG …) and project initiatives. Exemplify use and importance of in-situ data – from a GEO perspective; Examples of the use and importance of in-situ data in GEO initiatives (e.g., GEOGLAM, GEO Mountains, TWIGA-TAHMO, GEO Aqua Watch, and others?);
- What organisational, policy, and governance landscape should GEO fit into? Where can GEO make a difference? Key (international) partners and organisations (e.g., Research infrastructures, WMO, NOAA, FAO, …).

Examples of 'Key Challenges':

[1] Partly based on the GEO Engagement Strategy



Towards

Supports

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GEO Work Programme Activities

Earth intelligence for all

Self-assessment tool

Fairification tool

Dialogue Series

G-reqs

GEO Knowledge Hub

EuroGEO

AmeriGEO
Earth Observations for the Americas

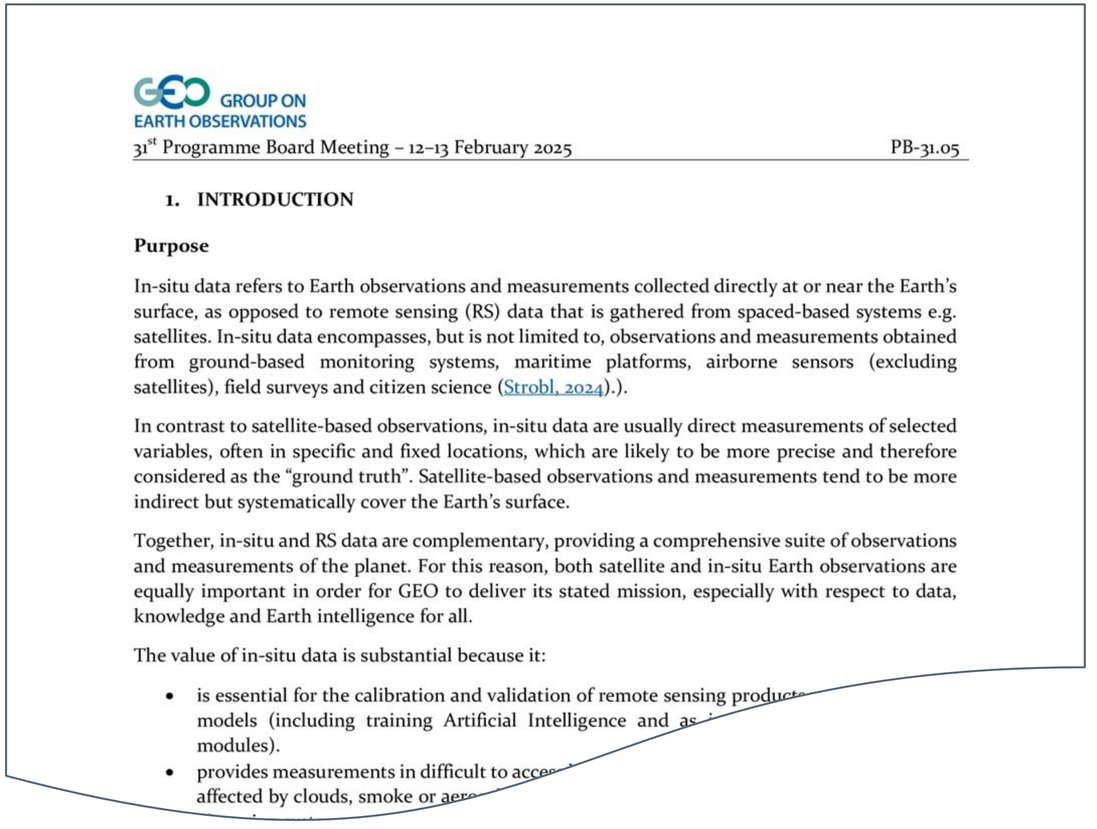
AfriGEO
Earth Observations for Africa

AOGEO
Earth Observations for Asia-Oceania

GEO In-situ Data Strategy

The goal of the strategy document is to **coordinate in-situ data providers**, **mobilize GEO members** and **participating organizations**, **engage in-situ data users**, and **advocate** for **in-situ open knowledge**.

It aims to **foster** a **change in the mindset** of the GEO Community by ensuring **in-situ data sharing** and management is an integral part of all activities.



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31st Programme Board Meeting – 12–13 February 2025 PB-31.05

1. INTRODUCTION

Purpose

In-situ data refers to Earth observations and measurements collected directly at or near the Earth's surface, as opposed to remote sensing (RS) data that is gathered from spaced-based systems e.g. satellites. In-situ data encompasses, but is not limited to, observations and measurements obtained from ground-based monitoring systems, maritime platforms, airborne sensors (excluding satellites), field surveys and citizen science (Strobl, 2024).).

In contrast to satellite-based observations, in-situ data are usually direct measurements of selected variables, often in specific and fixed locations, which are likely to be more precise and therefore considered as the "ground truth". Satellite-based observations and measurements tend to be more indirect but systematically cover the Earth's surface.

Together, in-situ and RS data are complementary, providing a comprehensive suite of observations and measurements of the planet. For this reason, both satellite and in-situ Earth observations are equally important in order for GEO to deliver its stated mission, especially with respect to data, knowledge and Earth intelligence for all.

The value of in-situ data is substantial because it:

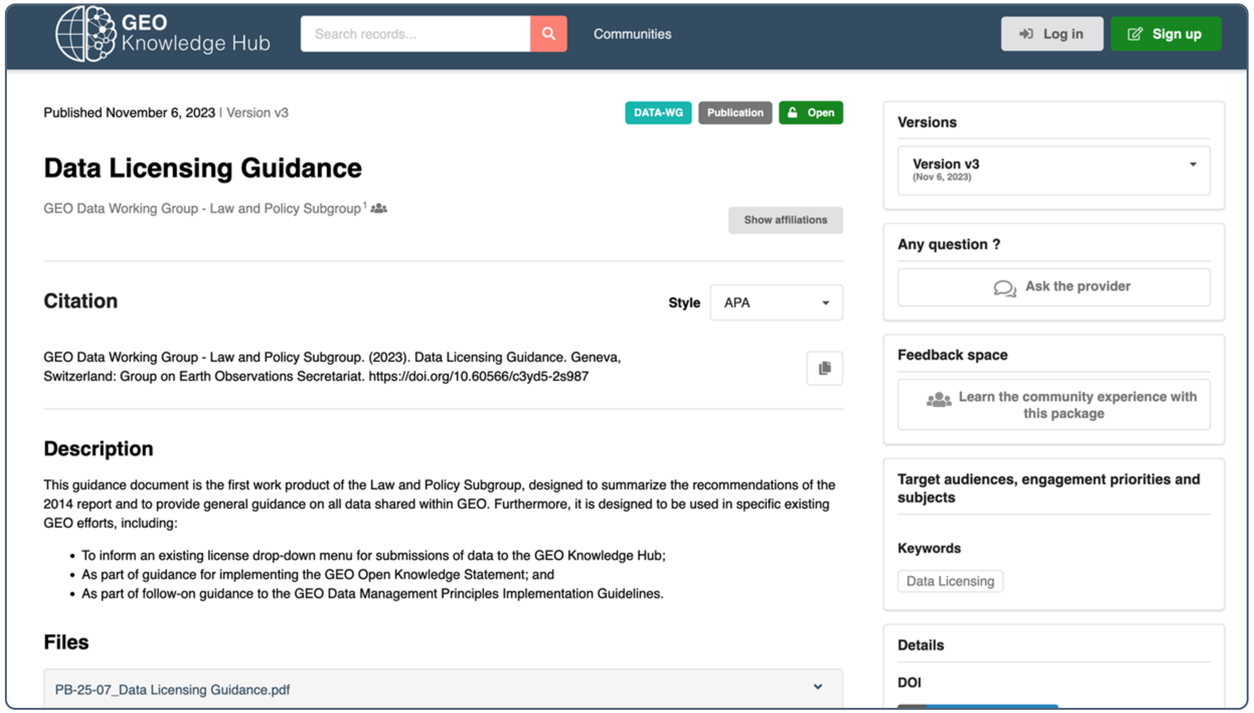
- is essential for the calibration and validation of remote sensing produc… models (including training Artificial Intelligence and as… modules).
- provides measurements in difficult to acce… affected by clouds, smoke or aer…

GEO Data and Software Licensing Guidance

Data licensing guidance

Identifying the data's owner and what others are allowed to do with it. GEO Guidance specifies required use of one of the following:

- Creative Commons Zero 1.0 Universal Public Domain Dedication (CC0)
- Creative Commons Attribution 4.0 International (CC BY 4.0)
- Open Data Commons Public Domain Dedication and License (PDDL) v1.0



doi.org/10.60566/c3yd5-2s987

Software licensing guidance

This document provides guidance to inform software developers and users about what others are permitted to do with the software.

GEO Infrastructure Development Task Team (GIDTT)

GEO Secretariat Present to EXCOM an EAG Follow up plan

March 2023

Re-establishment of GIDTT by EXCOM

July 2023

GIDTT activities start

September 2024

Post 2025 Strategy

GEO Post 2025 Strategy Full Document.pdf (earthobservations.org)

"There is a clear need for a global partnership where data providers and users from all communities work together, leading to better coordination, greater inclusion, reduced duplication, and faster action"

Building on the achievements of the past 10 years, GEO reaffirms its commitment to full and open access to Earth observation data, knowledge, products and services. **GEO also reaffirms its commitment to promote data and knowledge sharing and the co-development of services that empower users to make sound environmental decisions, enable economic opportunities and promote good governance.**

This means that GEO will continue to facilitate the supply of Earth observation data, but at the same time strengthen demand-led activities, providing users with insights for b decision-making, sourced from across the Earth observation value chain and covering multiple thematic areas. The

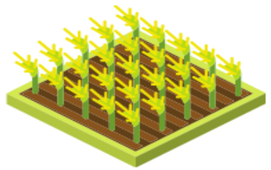
Current GEOSS

GEO Infrastructure

Which EO resources are made available through the GEO Infrastructure?

Data and resources

Satellite data and datacube



In situ

Services

Tools

EO Derived

Applications

Knowledge

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What is the added value of the revised GEO Infrastructure ?

EO resources will be organized by **Focus Areas** and by curated **“Scenarios-Services”** thus guiding the end users to **discover**, **access**, **use,** and **re-use** available **EO Resources** to provide solutions **to a specific socio-environmental problem,** having access to the **full landscape of EO efforts for domain-specific aspects.**

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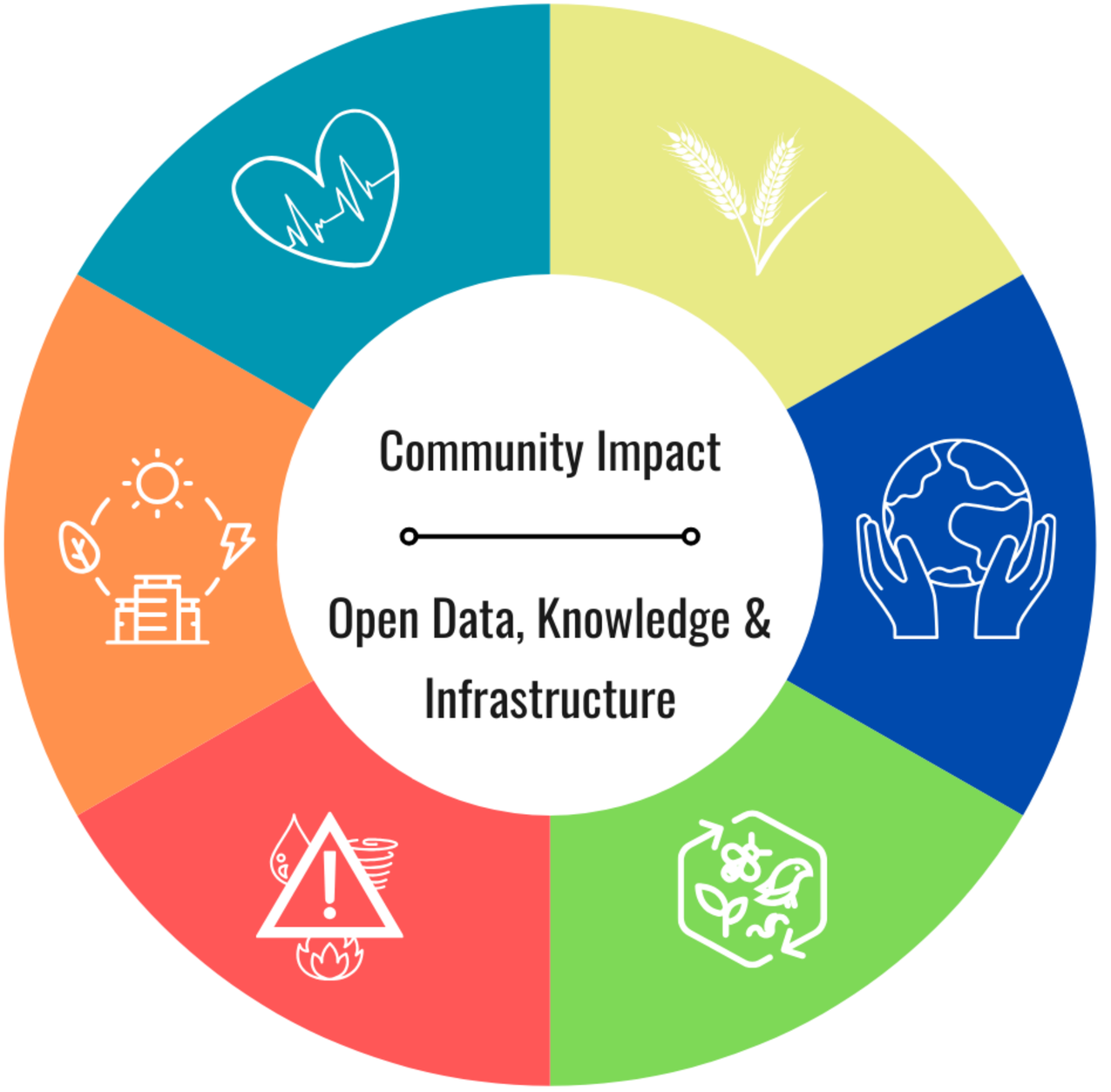
FOCUS AREAS

- AGRICULTURE & FOOD SECURITY
- WATER & LAND SUSTAINABILITY
- ECOSYSTEMS, BIODIVERSITY & CARBON MANAGEMENT
- WEATHER, HAZARD & DISASTER RESILIENCE
- CLIMATE, ENERGY & URBANIZATION
- ONE HEALTH
- COMMUNITY IMPACT
- OPEN DATA, KNOWLEDGE & INFRASTRUCTURE



What is the definition of a “Scenario-Service” ?

"Scenario-Service" is the "**glue" that binds resources into reusable, scalable solutions**. It integrates EO Data and Knowledge, models, and advanced technologies to deliver actionable Earth intelligence.

This approach ensures that the **resources are well-organized and capable of addressing policy and decision-making challenges effectively and sustainably.**

Food Security and Agriculture

E.g. Crop type Mapping

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Responding to questions with "Scenario-Services"

- What are the best ingredients to perform a crop type mapping?
- Who are the best providers and fit for use in my area?
- Where can I find them?

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What problem are you trying to solve ?

Why

- Agriculture & Food Security
- Water & Land Sustainability
- Ecosystems-Biodiversity & Carbon Management
- Weather & Disaster Resilience
- Climate, Energy & Urbanization
- One Health

Who

Developer
GIS specialist

What's your profile ?

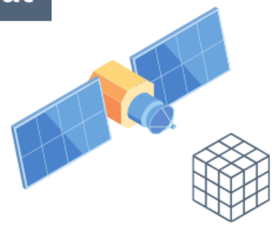
Non-technical

Where **When**

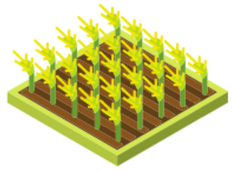
Location and time

What

Data and resources



Satellite data and datacube



In situ

Services

Tools

EO Derived

Applications

Knowledge

- **W**HY: What is the problem you are trying to solve
- **W**HO: What is your profile, technical or nontechnical
- **W**HERE: Where is the area of interest
- **W**HEN: Timeframe of the EO Resources required
- **W**HAT: Which resources are you looking for

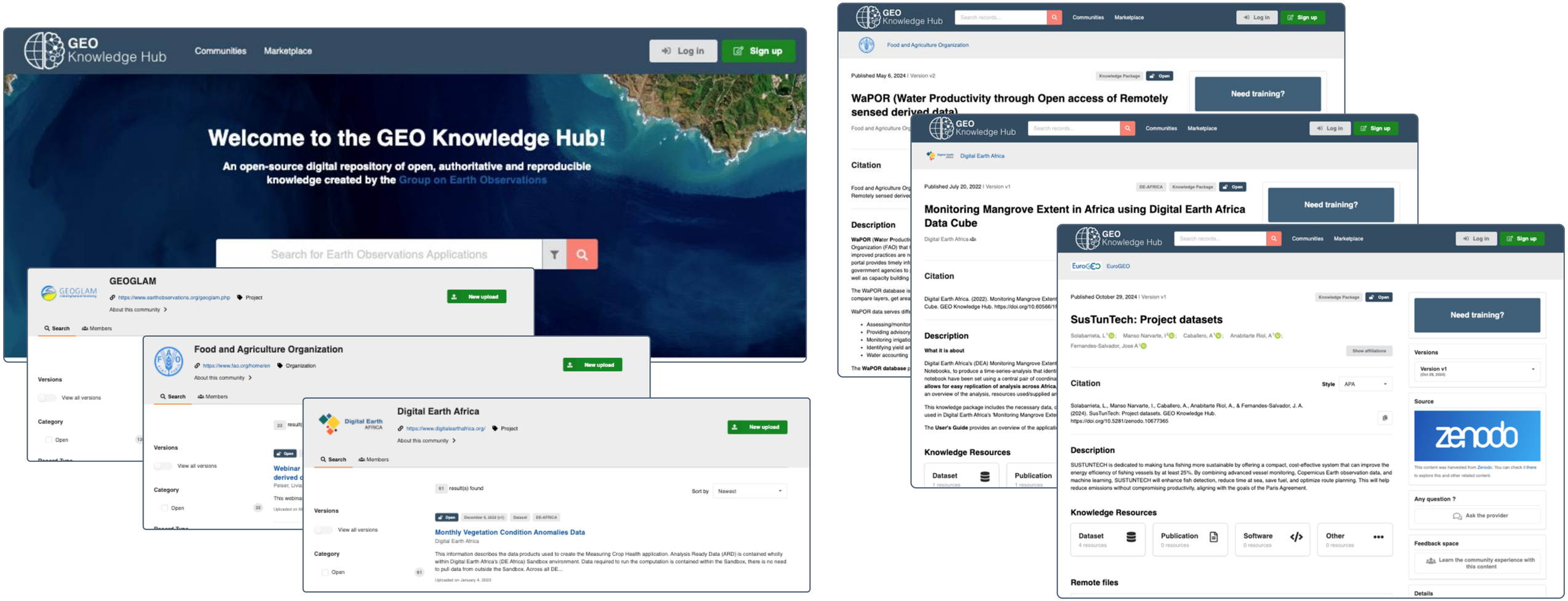
Who is the end user of the GEO Infrastructure?

Technically EO skilled individuals, leveraging the GEO Infrastructure to **preserve, learn**, **discover**, **access**, **use** and **re-use** available EO resources working in Governmental agencies, national, regional, and international organizations with the role of providing preliminary analysis and provide initial answers to decision makers related to or multiple socio-environmental problematics.

GEO Knowledge Hub

The **GEO Knowledge Hub** is a central cloud-based digital library created to **preserve**, **disseminate**, and **support** the reuse of EO Applications developed by the **GEO Community**

The GEO Knowledge Hub



gkhub.earthobservations.org/

gkhub.earthobservations.org/national/countries/south-africa

Thank you!

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