

GEO Strategic Plan 2016-2025: Implementing GEOSS

Preface

Global environmental change, and its resulting impacts on all aspects of society, is one of the primary challenges of humankind, even more so today than in 2003 when governments and international organizations committed to a vision of a future wherein decisions and actions for the benefit of humankind are informed by coordinated, comprehensive and sustained Earth observations. In 2005, the first concrete step toward achieving that vision was taken with the establishment of the Group on Earth Observations (GEO), whose primary goal was to create the Global Earth Observation System of Systems (GEOSS).

In the intervening decade, GEO has had considerable success in developing GEOSS, advocating broad, open data sharing and access, initiating major global monitoring initiatives, strengthening regional coordination, and establishing a strong and diverse community. Building on these accomplishments, yet recognizing the need of further collective effort to foster the use of Earth observation resources to their fullest extent, the GEO Ministers extended the mandate of GEO for a second decade at the Geneva Summit in January 2014. The Ministers resolved to “improve the effectiveness of GEO’s actions, to broaden engagement and collaboration of stakeholders including decision makers, and to sustain resources for GEOSS’ continuous development and functioning,” and requested that a new plan to achieve these goals be developed by the next Ministerial Summit.

The resulting “GEO Strategic Plan 2016-2025: Implementing GEOSS”, which follows, builds on a strong GEO foundation and proven successes, and identifies improvements in areas highlighted in the Geneva Declaration, including strengthening the Societal Benefit Areas (SBAs); engaging more broadly with stakeholders, the United Nations, and the private sector; establishing a robust, steady resourcing mechanism within the voluntary framework of GEO; and identifying new opportunities for GEO.

The plan was developed by an *ad-hoc* Implementation Plan Working Group (IPWG) through an extensive process of consultation and deliberation, carefully weighs the inputs received from the GEO governing bodies, from members of the GEO Community, and from other stakeholders. The Plan articulates what GEO will strive to be, and to achieve, over the next decade.

The implementation of the GEO vision will take full advantage of, and benefit from, advances in technology in areas such as the Internet, applications, and portable devices; Information and Communication Technology; Physical/Geophysical data and monitoring technology/modeling approaches; and High Performance Computing and “Big data”. These advances will inform the approach and scope of GEO actions and GEOSS implementation in the 2016 - 2025 decade.

The Plan is presented in two parts. Part A outlines the Strategy, affirming GEO’s Vision and Mission, highlighting the value of GEO’s unique capabilities, and establishing three Strategic Objectives – Advocate, Engage, Deliver – to guide the work of GEO through the next decade. Part B outlines how GEO will implement its Vision and Mission, establishing a set of Core Functions and associated, anticipated results that, based on current achievements, will frame the work of GEO and enable the broad and diverse GEO community to work together to achieve its common goal.

On behalf of the GEO Plenary, and the global GEO community, we extend our deepest appreciation to the IPWG for its exceptional work in developing the “GEO Strategic Plan 2016-2025: Implementing GEOSS”. Further, we express our gratitude to the GEO Implementation Boards, the Data Sharing Working Group, the Monitoring and Evaluation Working Group, the Data Management Principles Task Force, the GEO Secretariat and the entire GEO Community for their contributions to the development of the Strategic Plan, and for their commitment to GEO – past, present, and future.

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Foreword

GEO, the Group on Earth Observations

The World Summit on Sustainable Development (Johannesburg, 2002), highlighted the urgent need for coordinated observations relating to the state of the Earth. At the first Earth Observation Summit (Washington D.C., 2003), governments and international organizations, as well as the European Commission, adopted the Earth Observation Summit Declaration signifying a political commitment to move towards the development of a comprehensive, coordinated, and sustained Earth observation system of systems. At the second Earth Observation Summit (Tokyo, 2004), an ad-hoc group on Earth observations was tasked to develop a 10-Year Implementation Plan which was adopted at the third Earth Observation Summit (Brussels, 2005). This third Summit also formally established the intergovernmental Group on Earth Observations (GEO) as a voluntary coalition of governments and Participating Organizations having as its mission the implementation of the Global Earth Observation System of Systems (GEOSS) to meet the need for timely, quality long-term global information as a basis for sound decision-making.

Subsequent GEO Ministerial meetings have re-affirmed this commitment to implement GEOSS and, in 2014, the mandate of GEO was renewed through 2025. The GEO-X Plenary (January 2014) established the Implementation Plan Working Group (IPWG) and gave it the task of preparing an implementation plan for GEO's next decade, to be presented for acceptance at the GEO-XII Plenary and endorsement at the Ministerial Summit in 2015.

This Strategic and Implementation Plan provides a framework for GEO to fulfill its Vision and deliver on Strategic Objectives, including implementing GEOSS, over the next decade. The Plan will be implemented through a set of activities within specific timeframes as defined in Work Programmes.

Part A: Strategy

Societal Challenges and Opportunities

Society today is facing unprecedented challenges in terms of food, water and energy security; resilience to natural hazards; population growth; pandemics of infectious diseases; sustainability of ecosystem services; poverty and the development of a sustainable economy. Climate change cuts across all of these challenges with the potential to greatly exacerbate them. Moreover, in this inter-connected world, the impact of a single event can immediately cross borders and bring cascading consequences to locations further away.

Concerted, global action is needed to respond to societal challenges in order to improve living conditions for all people, especially the world's poorest citizens. Sustainable and equitable solutions require humankind to make intelligent, evidenced-based decisions that recognize the linkages between behaviour and impact on the planet. At the same time, these challenges point to opportunities for creating sustainable economies that can provide secure environmental and social conditions, while ensuring these conditions remain optimal for future generations.

Earth observations from diverse sources, including satellite, airborne, *in-situ* platforms, and citizen observatories, when integrated together, provide powerful tools for understanding the past and present conditions of Earth systems, as well as the interplay between them. These tools, and the improved knowledge they provide, together with socio-economic data describing the human dimension in the global environment, can help solve problems, address and mitigate risks, and deliver skillful predictions of the future behaviour of Earth systems. The outcome of this information chain is that the potential consequences of human activities on the planet can be understood, anticipated and addressed. As such, ***Earth observations are an indispensable component to measure and monitor our progress towards addressing societal challenges.***

The United Nations (UN) has responded to societal challenges by establishing the Sustainable Development Goals (SDGs), to guide global efforts towards a better future. The SDGs include clear benchmarks against which the world can measure progress over the next 15 years. Through the provision of open, timely and reliable data and information, Earth observations are an opportunity to supplement statistical analyses in the assessment of indicators towards the attainment of the SDGs and thus have a critical role to play in support of SDG monitoring frameworks.

Similarly, Earth observations can be used to strengthen other international treaty and convention follow-up and review frameworks, such as those supporting the Sendai Framework for Disaster Risk Reduction, the United Nations Framework Convention on Climate Change, or the UN Convention on Biological Diversity.

The extraordinary monitoring capabilities of the countries and organizations that participate in GEO afford decision-makers an unprecedented opportunity to gain foresight about critical factors that impact our future –

from tomorrow's natural disasters, to next season's crop outlook, to the state of the oceans in ten years, to ongoing food and public health security of the countries.

GEO's Vision

GEO, a global partnership of governments and organizations, envisions a future wherein decisions and actions for the benefit of humankind are informed by coordinated, comprehensive and sustained Earth observations.

GEO's Mission

To realize its Vision, GEO works to connect the demand for sound and timely environmental information with the supply of data and information about the Earth that is collected through observing systems and made available by the GEO community. In doing so, GEO works to unlock the power of Earth observations by facilitating their accessibility and application to global decision-making within and across many different domains.

GEOSS, the Global Earth Observation System of Systems

A central part of GEO's Mission is to build the Global Earth Observation System of Systems (GEOSS). GEOSS is a set of coordinated, independent Earth observation, information and processing systems that interact and provide access to diverse information for a broad range of users in both public and private sectors. GEOSS links these systems to strengthen the monitoring of the state of the Earth. It facilitates the sharing of environmental data and information collected from the large array of observing systems contributed by countries and organizations within GEO. Further, GEOSS ensures that these data are accessible, of identified quality and provenance, and interoperable to support the development of tools and the delivery of information services. Thus, GEOSS increases our understanding of Earth processes and enhances predictive capabilities that underpin sound decision-making.

GEO's Value

Because of its broad intergovernmental membership and variety of contributing organizations, GEO is able to assemble and coordinate expertise from across different disciplines and communities. GEO uses this **convening power** to bring together the unique combinations of partners required to address societal challenges faced by communities across the globe at every scale, from individuals to countries, to continents, drawing on comprehensive, coordinated and sustained Earth observations.

GEO's Strengths

The strengths of GEO lie in its distinctive characteristics:

- a **unique, multidisciplinary initiative** that occupies an **upstream coordination position** on Earth observations in the international community;
- a **flexible and agile forum** for governments, public sector agencies, UN bodies, specialized organizations, universities and the private sector to work together on improving the quality, timeliness, range and availability of Earth observations, data, information and knowledge about the Earth system; and
- a **facilitator of policy-level dialogue** on the importance and

coordination of Earth observation systems (including ground-, air-, water- and space-based sensors, field surveys, and citizen observatories).

Given these strengths, GEO is strategically situated to:

- leverage its convening power to bring together those who need information for sound decision-making, those who collect information about the Earth, and those who turn information into knowledge and package it as user-friendly tools, applications and services;
- identify existing information and observation gaps, as well as gaps in institutional and technological capacities that hinder the use of information even when it is available;
- mobilize action to mitigate these gaps by empowering countries and organizations to strengthen and develop their own contributions of Earth observation resources to GEOSS, and to leverage partner networks to expand and maximize access of Earth observations to the benefit of GEOSS; and
- link GEOSS to relevant socio-economic data through partnerships with, for example, the UN Statistics Division (UNSD) and other statistical agencies to provide enhanced information for decision-making.

GEO's Scope

Decision-making relies, and will continue to rely, on the ability of expert communities to utilize complex data from Earth observations and combine these with social and economic analyses. Sound, evidence-based decision-making will encourage sustainable behaviour by humankind in relation to Earth's resources, leading to economic benefits for all of society. Capitalizing on its strengths, GEO will work during the next decade to ensure that decision-making is increasingly informed by Earth observations, provided through, and as a result of, the contributions of its Members and Participating Organizations.

Through engagement with user communities, GEO will play a key role in systematically: identifying data needs while advocating the provision of, and access to, multiple sources of data; delivering tools, skills and services to allow the intelligent exploitation of the data by the user communities; and showcasing the value of Earth observation data in order to expand interest in, and usage of, those observations, as well as demonstrate their benefits to society. This end-to-end process of identifying needs, ensuring the availability of data with which to develop information to address societal challenges, and transforming that information into knowledge through the generation of products and services for end-users, defines the scope of GEO.

Advocate, Engage and Deliver

To realize its Vision and maximise the benefits that GEO can bring to users, through 2025, GEO defines three spheres of activity focusing on advocacy for the value of Earth observations as a fundamental component of timely information; engagement with stakeholder communities to address societal challenges; and delivery of critical data, information and knowledge to inform decision-making. Accordingly, three Strategic Objectives will guide GEO activities through 2025:

Strategic Objective 1:

To **Advocate** the importance of Earth observations as irreplaceable resources that must be protected, rendered fully and openly accessible (including through contribution to GEOSS), and integrated to provide maximum value in support of achieving national and international calls for resilient societies, sustainable economic growth, and a healthy environment worldwide.

Strategic Objective 2:

To **Engage** with stakeholder communities and foster strategic partnerships to address global and regional challenges, by increasing the understanding and use of Earth observations available in support of science-based and data-driven decision and policy-making.

Strategic Objective 3:

To **Deliver** data, information and knowledge enabling stakeholders to improve decision-making processes and inform policy requirements, promote the exchange of best practices, enable the uptake of new technologies, and create new economic opportunities while leveraging public sector investment through standardization, collaboration and innovation.

**Societal
Benefit Areas**

Guided by the Strategic Objectives, the Societal Benefit Areas (SBAs) are the domains in which Earth observations are translated into support for decision-making. GEO will facilitate the development of solutions to societal challenges within these SBAs by mobilizing resources including observations, science, modelling and applications, to enable end-to-end systems and deliver services for users.

Underpinning the SBAs is research pertaining to terrestrial, freshwater, ocean and atmospheric domains, over a range of spatial and temporal scales that makes use of satellite, airborne and *in-situ* Earth observations for monitoring and understanding the current status of Earth systems. This research can also identify potential changes in Earth systems that may result in risks for global society, providing the time and means to respond.

Climate change and its impacts cut across all SBAs. Supporting sustainable development agendas while tackling the effects of climate change is an example illustrating this inter-linkage. Hence, GEO will supply the requisite Earth observations in support of effective policy responses for climate change adaptation, mitigation and other impacts across the SBAs. GEO will work with its partners, such as the World Meteorological Organization (WMO), the Global Climate Observing System (GCOS) and the Food and Agriculture Organization (FAO), to lead national, regional and global efforts to enhance global observation systems, thereby strengthening resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.

GEO will advocate the value of Earth observations, engage communities and deliver data and information in support of:

- **Biodiversity and Ecosystem Sustainability**: by bridging multiple types of observation data and knowledge to provide information on the health of Earth's biological and ecological systems and their services to society; in order to strengthen conservation, restoration and sustainable use of ecosystems and biodiversity, including marine planning and ocean use, and forest management, in response to changes in climate and land use, through science-society collaborations at local, national, regional and global levels.
- **Disaster Resilience**: by increasing capacity to prepare, forecast, mitigate, manage and recover from disasters; in order to achieve a substantial reduction of risk and losses of life and property through an understanding of disaster risk brought by maintaining and strengthening *in-situ* and remotely-sensed Earth and climate observations while enhancing the access to, and the sharing and use of, data and information obtained through such observations.
- **Energy and Mineral Resources Management**: by enhancing the discovery, development and sustainable production of mineral and renewable energy resources; in order to facilitate substantial increases in the share of renewable energy in the global energy mix, through usable, actionable information on resource assessment, monitoring and forecasting of intermittent energy sources, including solar, wind, ocean, hydropower, geo-thermal power and biomass.
- **Food Security and Sustainable Agriculture**: by underpinning development, management and forecasting of global food and agricultural production on land and in the water; in order to end hunger, achieve food security (including monitoring for quality, safety and correct identification) and promote sustainable agriculture adapted to climate change impacts through strengthening food production monitoring and early warning systems, and providing accurate, timely information on agricultural production status, outlook and forecasts.
- **Infrastructure and Transportation Management**: by providing support for planning, monitoring and management of infrastructure (dams, roads, rail, ports, and pipelines) and transportation (air, land and sea); in order to minimize environmental impacts while moving towards a low-carbon footprint.
- **Public Health Surveillance**: by yielding insight into the threat of vector-borne and environmentally-linked diseases, taking into account impacts of climate change; in order to promote a substantial reduction in the number of fatalities and illnesses from infectious diseases, environmental pollution and health risks, through raising public awareness and supporting policy making and management with accurate monitoring and early warning at local, national, regional and global levels.

- **Sustainable Urban Development**: by assisting in the development of resilient cities and assessment of urban footprints; in order to make cities and human settlements inclusive, safe, resilient and sustainable through identifying economic externalities, managing environmental, climate and disaster risks, and building capacity to participate, plan and manage based on objective information regarding urban development.
- **Water Resources Management**: by supporting management of water resources, including the cryosphere, while fostering and maintaining water quality; in order to ensure the availability and sustainable management of water and sanitation through sound science-based public policies informed by Earth observations, modelling and data integration.

**Equipping
GEO
to succeed**

To achieve its Vision and Strategic Objectives, GEO has established an Implementation Plan to chart its activities through 2025. The Plan, outlined in Part B that follows, builds on achievements from GEO's first decade, such as: the development of GEOSS; advances in the areas of data sharing and access; the initiation of major global monitoring initiatives; gains in regional coordination, research and innovation; and the establishment of user-driven networks and projects. GEO will realize further improvements in these areas by implementing a set of Core Functions that define and focus the scope of activities essential for the attainment of the Strategic Objectives. To carry out these activities, mechanisms for efficient implementation are defined, which allow a wider and stronger engagement with stakeholders.

Ministers will provide the overall strategic policy direction for GEO, while Plenary, composed of Members and Participating Organizations, will be the main decision-making body. A Programme Board will support the development and implementation of GEO activities.

GEO will rely on governance principles and decision-making processes, namely:

- voluntary, non-binding participation;
- consensus-oriented decision-making;
- legitimacy of decision-making;
- accountability to Plenary and Ministers;
- transparent management of activities and funding ; and
- inclusive of Participating Organizations in the governance of GEO.

Strengthened institutional and financial mechanisms will be explored to ensure GEO maintains a stable and sustainable footing.

Part B: Implementation Plan

To implement the Strategy identified in Part A, GEO will leverage the successes of its first decade. Going forward, GEO will advance the evolution of GEOSS, and promote the adoption of the *GEOSS Data Sharing and Management Principles* while broadening its engagement with relevant stakeholders. GEO will also focus its priorities around Core Functions, which will be enabled through Implementation Mechanisms, effective governance, and resource mobilization frameworks.

Building on Past Successes

Since its inception, GEO has realized significant accomplishments on which to build the work of the next decade. Notably, GEO has:

- significantly advanced the international sharing and interoperability of Earth observation and environmental data by promoting the adoption of common standards and developing pilot phase infrastructure and information architectures. This has been critical to improving the discovery, access, integration and use of Earth observations;
- fostered substantial collaboration among governments and international organizations by creating new global Earth observation initiatives and supporting vital regional initiatives focused on the safety and security of the most vulnerable populations; and
- advanced new Earth observation efforts by working to close information gaps via the creation and development of new, user-driven networks and projects.

The Evolution of GEOSS

GEO has devoted considerable efforts to building the GEOSS infrastructure and capabilities that have made Earth observations discoverable. This infrastructure comprises both observing and information systems:

- *observation systems*: which include ground-, air-, water- and space-based sensors, field surveys and citizen observatories. GEO works to coordinate the planning, sustainability and operation of these systems, aiming to maximize their added-value and use; and
- *information and processing systems*: which include hardware and software tools needed for handling, processing and delivering data from the observation systems to provide information, knowledge, services and products.

To continue leveraging these successes through 2025, GEO will evolve GEOSS and its infrastructures to meet current and emerging needs by:

- extending the user audience to decision-makers and the general public;
- placing additional focus on the accessibility and usability of Earth observation resources to improve our scientific understanding of the Earth processes, and enhance our predictive capabilities that underpin sound decision-making;
- providing a service framework to engage partners and user communities in evolving the current infrastructure to enable collaborative tools for co-creation of products and services suitable for effective exploitation by user communities; and
- evolving the current system of systems component based architecture with an open systems platform that is flexible, sustainable and reliable for data

access, integration and use, and the delivery of knowledge-based products and services.

**GEOSS
Data Sharing
Principles**

GEO recognizes that the societal benefits arising from Earth observations can only be fully achieved through the sharing of data, information, knowledge, products and services. GEO has therefore promoted fundamental principles for data sharing, expanding the trend towards open data worldwide. Thus, as it embarks on its second decade, GEO now aims to implement the following GEOSS Data Sharing Principles:

- 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 reuse, subject to the conditions of registration and attribution when the data are reused;
- 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; and
- all shared data, products and metadata will be made available with minimum time delay.

**GEOSS
Data
Management
Principles**

To further maximize the value and benefits arising from Earth Observation data, GEO will continue to work with partners to promote the use of Data Management Principles¹, which are based on discoverability, accessibility, usability, preservation and curation. These principles address the need for common standards and interoperability arrangements. This will ensure that data and information of different origin and type are comparable and compatible, facilitating their integration into models and the development of applications to derive decision support tools.

**Stakeholder
Engagement**

A key tenet of GEO's Vision is that Earth observation data should serve societal needs. The value of this data is fully realized when it is transformed into useable knowledge and information to address societal needs. GEO will therefore convene key stakeholders across the provider-user spectrum to co-design a process to systematically identify and document Earth observation needs for addressing specific problems within the scope of the SBAs.

United Nations Agencies, Treaties and Conventions

GEO will build stronger relationships with complementary global Earth observations organizations, including those UN Agencies that are already Participating Organizations, as well other national, regional and global entities, particularly in regards to the important role Earth observations can play in support of measuring, monitoring and achieving the Sustainable Development Goals (SDGs).

¹ See *GEO Strategic Plan 2016-2025: Implementing GEOSS Reference Document*

Capacity Building

Building capacity, as well as sustaining and enhancing existing capacity, is essential for developing the competencies of GEO Members and Participating Organizations in the effective use of Earth observations for responding to societal challenges and addressing sustainable development issues. The need for greater capacity to access and use Earth observation data, information, tools and services is particularly strong in developing countries. To integrate their use in the decision-making processes will require collaborations with key government and regional entities and international donor/development organizations to establish and increase awareness about the value of Earth observation information, facilitate the development of national GEO and Spatial Data Infrastructures, as necessary, and assist in the development of technical and human capacity to fully utilize these resources.

To further these goals, GEO will:

- promote the engagement of institutional users worldwide, including both developed and developing countries;
- assist developing countries and regions in increasing their capacity to acquire, share, store, maintain, and utilize Earth observation data and information;
- engage with the international development and donor organizations to identify country-specific opportunities for demonstrating the value of Earth observations and pursuing opportunities to work with the appropriate national and sub-national entities to develop activities towards improving decision-making; and
- promote regional cooperation through national and regional GEO mechanisms.

Communities of Practice

Communities of Practice may form within or engage with GEO in response to specified needs or shared interests. Communities of Practice may, for example, consider aspects of societal challenges, or managing and developing pooled resources. These Communities demonstrate the convening power of GEO by engaging stakeholders along the full continuum of the data and information chain, from providers, to processors, to end users. Existing Communities of Practice may be mobilized to assist with engagement activities aimed at facilitating a comprehensive dialogue between Earth observation providers and end users in order to identify Earth observation products that address users' needs.

Private Sector

GEO offers unique information and engagement opportunities to the private sector and international development banks, to serve their needs in areas such as agriculture, transportation, resource extraction and insurance sectors. In turn, GEO benefits from the participation of the private sector through access to new types of data, diverse capabilities and new technologies, and broader community networks. Further, development banks can offer a unique opportunity for GEO to engage directly with developing countries. Given these mutual benefits, the private sector and development banks have the capacity to be key contributors to making substantive progress towards achieving GEO's Strategic Objectives.

Core Functions

GEO will therefore actively engage these stakeholders at all stages of the data, information, and knowledge chain, to not only seek out new opportunities for collaboration in achieving the Strategic Objectives, but also to:

- enhance the added value of GEO through facilitating the use of GEOSS by the private sector; and
- improve the evidence base and implementation of environmental decision-making, both in private and public sectors.

GEO engages with stakeholder communities and acts as a broker, connecting users, data providers, engineers, scientists and other relevant experts to create solutions to global challenges that transcend both national and disciplinary boundaries. Drawing on these partners, which encompass government departments, the private sector, civil society and academia, GEO will implement a set of Core Functions essential for the realization of its Strategic Objectives. These Core Functions are accompanied by specific, measurable, and achievable targets designed to enable an effective implementation, including the monitoring of progress and evaluation of achievements.

The Core Functions for GEO are:

Identifying user needs and addressing gaps in the information chain

Implement a structured approach to identifying user needs for observations and services. Beginning with areas where opportunities and relationships with users have been identified, convene key stakeholders across the value chain, from providers of the observations to the end user for whom services are developed, from the public and private sector, in order to:

- identify those Earth observations most needed, relevant and useful to users in each SBA;
- articulate the preferences of users with respect to information products and tools, including timeliness, format and frequency, in order to contribute value to the decision making process; and
- confer with and obtain commitments from providers and users to ensure these observations, products and tools are delivered and used in a comprehensive, coordinated and sustained way.

Sustaining foundational observations and data

Act to sustain observing systems and data provision by compiling global perspectives regarding existing and planned observational infrastructures. Establish a framework for Members, Participating Organizations, and other stakeholders to encourage the development of common observational strategies. Ensure decisions and actions are informed by coordinated, comprehensive and sustained Earth observations, as set forth in GEO's Vision.

Fostering partnerships and mobilize resources

Connect users, resource providers, and experts from different sectors in the domain of Earth observations and environmental information to form partnerships, in order to:

- work with funding agencies at national and international levels to

encourage increased investment in GEO activities and use of Earth observation data;

- pool resources and develop knowledge and tools that realize beneficial economic, social and environmental impacts across all SBAs; and
- initiate and support studies that address challenges related to global resource mobilization, at all stages of the funding cycle, while providing input to policies relevant for Earth observations.

Advancing GEOSS and best practice in data management and sharing

Operate and continuously improve technical means that provide access to global Earth observation systems, so that the data, information, knowledge, products and services needed for scientific understanding and sound decision-making are increasingly easy to access, integrate, and use. Work with Members and Participating Organizations to implement the *GEOSS Data Sharing and Management Principles* and ensure that open data is discoverable, usable, accessible and preserved for integrated use across multiple communities. Promote life cycle management of data holdings, recovery of historic non-digital data, and the use of standards.

Implementing sustained global and regional services

Support the global sustainable development agenda and evidence-based decision-making. Monitor progress towards policy goals, such as strengthening SDG monitoring frameworks, and support necessary transitions towards achieving these goals. Incubate and pilot regional or global initiatives that provide data or information services to meet shared information needs for societal benefit. Develop strategies for handover and long-term ownership of service provision in host organizations.

Cultivating awareness, building capacity and promoting innovation

Cultivate awareness among key decision makers and stakeholders, including UN bodies, donor organizations, businesses, and other communities of intermediary- and end-users, of the value and importance of Earth observations. Build capacity in the domains of infrastructure and know-how, and facilitate the take-up of new and innovative approaches, such as crowd sourcing and cloud-based computing.

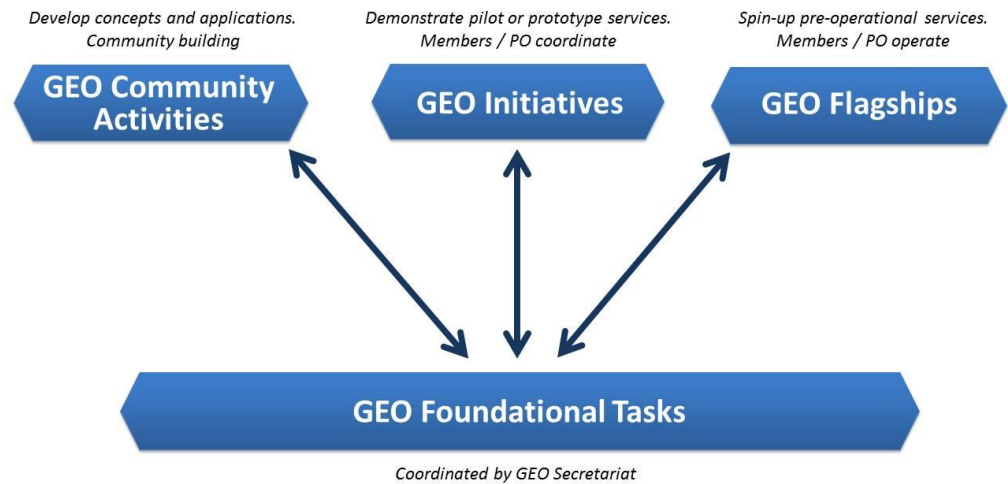
Establish and implement a communication and stakeholder engagement strategy. Provide input to policies and initiatives relevant for Earth observations such as protecting spectral domains from competing uses and basic global reference measurements (e.g. gravity, bathymetry and topography) that provide fundamental information underpinning all observation systems. Establish a collaboration framework for Members and Participating Organizations from both developed and developing regions, for example through long-term research partnerships or twinning projects. Assist developing countries and regions in increasing their capacity to acquire, share, store, maintain and utilize Earth observation data and information; demonstrate solutions, disseminate best practices, organize training workshops. Strengthen cooperation at regional and national level by identifying country-specific opportunities to develop Earth observation plans and establishing national GEO structures.

Implementation Mechanisms

The above Core Functions define the scope of actions needed for the attainment of GEO's Strategic Objectives. GEO actions range from substantial global activities with multi-faceted, long-term objectives and complex stakeholder communities, to single-focus activities in smaller groups. These different types of activities contribute to GEO's Strategic Objectives in various ways, but all make valuable contributions. GEO will implement these activities through four Implementation Mechanisms (see figure below). These mechanisms provide a framework, which is both flexible and open, enabling the broad and diverse GEO community to work together. Although they differ in the degree of maturity, there is no hierarchy between GEO actions implemented through different mechanisms in terms of importance, nor is there a necessary progression; however it is highly desirable that activities be proactively nurtured towards transitioning into operational services that deliver societal benefits.

Each of the mechanisms serves a different purpose in attaining GEO's Strategic Objectives, allowing activities of different scale and kind to be implemented.

- **GEO Community Activities** allow stakeholders to cooperate flexibly in a bottom-up fashion and with a low initiation cost. They can include a broad variety of activities with varying degrees of coordination. GEO Community Activities may, for example, define user needs, explore new frontier applications or demonstrate technical possibilities, or agree on specific observation or analysis protocols and data exchange.
- **GEO Initiatives** allow Members and Participating Organizations to coordinate their actions and contributions towards a common objective within an agreed, yet flexible framework. They develop and implement prototype services according to GEO priorities and have identified committed resources to a certain extent. GEO Initiatives may, for example, demonstrate technical feasibilities through pilot services, or serve a user need.
- **GEO Flagships** allow Members and Participating Organizations with a policy-relevant mandate to spin-up a dedicated operational service serving common needs and/or well-defined user groups. They develop and implement near-operational services according to GEO priorities and are fully resourced. GEO Flagships may operate for as long as they are able to generate sufficient impact to attract support for their activities. Once they reach a mature, operational stage, they may be taken up by operational organizations (e.g. GEO Participating Organizations), for their continued operation over the long term.
- **GEO Foundational Tasks** allow GEO to implement selected, often enabling, tasks to achieve GEO Strategic Objectives. These include coordination actions, gap analyses, the implementation of technical elements for accessing GEOSS, and other routine operations of the GEO Secretariat. Thus, they provide important support functions to Flagships, Initiatives, and Community Activities.



The four GEO Implementation Mechanisms.

Work Programme

A multi-annual GEO Work Programme, accepted by Plenary, will constitute the primary coordination and planning instrument to assist GEO with the selection and prioritization of its activities. The Work Programme defines the GEO Foundational Tasks as well as describes the plans of GEO Flagships and GEO Initiatives according to their applicable planning documents, and of GEO Community Activities according to the best knowledge of the GEO Secretariat.

Each Work Programme is proposed by the GEO Secretariat to the GEO Programme Board, based on input from GEO Members, Participating Organizations and the greater GEO community. Through an iterative process, the Programme Board will review and further develop the Work Programme to ensure alignment with the priorities of, and identify resource commitments from, Members and Participating Organizations before recommending the Work Programme to Plenary for acceptance.

The Work Programme strives to optimally pursue the achievement of the Strategic Objectives through the implementation of GEO's Core Functions, within the constraints of identified and committed resources. The Work Programme will align with the priorities of GEO Members and Participating Organizations and identify resource commitments by GEO Members, Participating Organizations, and other third parties, be they actual financial contributions or in-kind.

**Progress
Report**

An annual Progress Report will be compiled by the GEO Secretariat on all activities, drawing on available reports of the GEO Flagships, GEO Initiatives, GEO Foundational Tasks and, to the best of the Secretariat's knowledge, of GEO Community Activities. This Progress Report will give due recognition to the major contributions of GEO Members, Participating Organizations, and any third party. It will also enable an evaluation of progress towards the corresponding targets.

Governance

In order to successfully achieve its Vision, and Strategic Objectives, and develop all related functions, GEO will rely on governance arrangements as set out in the GEO Rules of Procedure. Ministers of the GEO Members, meeting periodically, will provide the political mandate and overall strategic direction for GEO.

Organizational Structure

- **Plenary:** The highest decision-making body of GEO is composed of Principals at the senior-official level, or their designated Alternates, representing GEO Members and Participating Organizations.

Plenary will meet at least annually and take decisions by consensus of GEO Members. The GEO Plenary may explicitly and formally delegate decision-making powers to other bodies of the organizational structure and/or other subsidiary bodies as appropriate, in the interest of efficiency and expediency in the implementation of GEO activities.

- **Executive Committee:** An Executive Committee, composed of representatives of GEO Members, will provide the strategic leadership for GEO activities when the Plenary is not in session. Four Co-chairs will lead the discussion of the Executive Committee. The number of seats on Executive Committee should be reflective of the GEO membership and geographic region. Further, election procedures for the Co-chairs should ensure that developing countries are represented.

In recognition of the important role of Participating Organizations and to help inform the discussions, a number of observer seats on the Executive Committee will be granted to Participating Organizations who are members of the GEO Programme Board.

- **Programme Board:** A Programme Board, composed of persons nominated by GEO Members and Participating Organizations, will support the development and implementation of GEO activities. In particular, the Board will oversee the establishment of the multi-year GEO Work Programmes as it ensures alignment of the scope and substance of activities proposed with GEO priorities and committed resources. It also examines proposed Implementation Plans for GEO Initiatives and Flagships.
- **Secretariat:** A Secretariat, led by a Director and accountable to Plenary and the Executive Committee, will facilitate and support GEO activities. The Secretariat primarily consists of co-located, suitable, professional and

administrative staff. The Secretariat may also play a central role in coordinating and implementing Foundational Tasks, to ensure good progress towards GEO's Objectives.

Legal Status

GEO will explore options, including independent legal status, to enable GEO participation in other international bodies and undertake financial and contractual transactions. Any mechanism for achieving independent legal personality will respect the voluntary intergovernmental nature of GEO, avoid cumbersome national and international approval processes, limit the administrative burden on the part of Members, and preserve GEO's flexibility in operating.

Resources through 2025

A sound, sustainable financial footing is required for GEO to be successful through 2025. Any mechanism to encourage contributions will respect the voluntary nature of GEO, be simple, adaptable, and applicable to GEO's context. The mechanism should also foster greater engagement with the private sector and philanthropic foundations while maintaining coherence and cohesiveness across GEO.

Contributions may be in-kind or cash, and may be designated for:

- GEO implementation activities, in accordance with the Implementation Mechanisms where resources committed are commensurate with the type of action; or
- the GEO Trust Fund, administered by the GEO Secretariat and supporting, as decided by Plenary, the GEO Foundational Tasks, specifically-earmarked GEO Flagships, and the operations of the GEO Secretariat.

In recognition of their value, in-kind contributions provided by Members and Participating Organizations will be quantified on an annual basis.

GEO will also explore mechanisms to achieve greater financial stability, such as: negotiating among GEO Members a projected annual budget; encouraging the use of multi-year contribution mechanisms to assist in long-term budget planning; determining minimum contributions and ensuring the maximum amount is used to support GEO activities; or negotiating a voluntary indicative scale of contributions. GEO will also investigate the funding models used by other international or intergovernmental organizations and or entities, explore an increase in GEO's operating budget reserve, and explore inviting contributions from non-government entities. In evaluating these options, GEO will consider the advantages and disadvantages of each option to ensure that any adopted mechanism(s) does not discourage Members or Participating Organizations from fully participating in GEO's Mission.

Moving Forward

This Strategic Plan will be implemented through specific activities outlined in the transitional Work Programme for 2016, and, starting in 2017, three -year Work Programmes for the duration of the Strategic Plan. Plenary will meet at least once annually to review progress towards the Strategic Objectives and provide overall guidance and direction. Ministers will meet at different

junctures, including at the mid-term to review progress and provide direction as appropriate, and at the end of the 10 years to conclude on the past and provide direction for the future. These meetings will be informed by the ongoing work of the Executive Committee, the Programme Board, and the GEO Secretariat.

As GEO enters the next decade it will focus on addressing the societal challenges facing humankind by being an advocate for the value of Earth observations, engaging with key stakeholders including the private sector and development banks, and delivering data, information and knowledge critical to informing decision making. This Strategy and Implementation Plan, implemented by a structured Work Programme process, sound governance and a plan for sustained resourcing, will enable GEO to fulfill its Mission and realize its Vision.