



**STRONGER.
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1st Joint Development Plan for Global Geodesy

Version 0.2: 24 July 2024

United Nations Global Geodetic Centre of Excellence

Background report to
E/C.20/2024/10/Add.2

**Committee of Experts on
Global Geospatial Information Management**
Fourteenth Session
New York, 7 - 9 August 2024

1st Joint Development Plan for Global Geodesy



Draft Report (Version 0.2 – 24 July 2024)



**United
Nations**



United Nations
Global Geodetic
Centre of Excellence

1st Joint Development Plan for Global Geodesy

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DRAFT

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Commented [NB1]: My apologies if I am missing your Member State or Partner Institution. Please let me know if I am and I will correct this this. Best regards, Nick

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1.0

INTRODUCTION

Background

Modern society is dependent on satellites, and satellites are dependent on the global geodesy supply chain.

In many countries, satellite information is essential for economic growth, the operation of critical infrastructure, and is a cornerstone of national defence forces.

Operation of critical infrastructure

Although best known as a positioning and navigation system, accurate on-board atomic clocks make Global Navigation Satellite System (GNSS) satellites excellent timekeepers. As a global, 24/7 operational, free (to the user) resource, GNSS (predominantly the Global Positioning System (GPS)) has become the world's primary system for the distribution of accurate (sub-microsecond) time. However, this heavy reliance on GNSS timing raises concerns about potential weaknesses in the global geodesy supply chain.

The U.S. Department of Homeland Security found that 15 out of 18 critical infrastructure and key resources sectors relied on the GPS including telecommunications, emergency services and financial exchanges.

Without GNSS timing, the operation of mobile phone networks would be impossible, stock exchanges would have reduced protection for investors and, the daily operation of power grids would be more difficult and labour intensive.

Economic benefits

National economies are increasingly reliant on revenue generated from satellite services. Over the next decade, global GNSS downstream market revenue is expected to grow at a mean annual growth rate of 9.2%, reaching a total of €492 billion by 2031. Over 82% of the revenue will be generated in mass market user segments (e.g. mobile devices, tourism, health and automotive) along with the

industry sectors of agriculture, urban development, and infrastructure.

In the same period, EO market revenues are set to double from roughly €2.8 billion to over €5.5 billion. Major contributors to this are expected to come from climate services, urban development and agriculture.

The satellite communications market size is estimated at US\$193 billion in 2024, and is expected to reach US\$297 billion by 2029, growing at rate of approximately 9% between 2024-2029. This is largely driven by increasing demand for high-speed internet, communication services, and data transfer across different industries.

Development agenda

A reliable global geodesy supply chain is fundamental to supporting the collection, integration, and utilization of all other geospatial data, which is necessary to measure, monitor, and evaluate progress of the 2030 Agenda for Sustainable Development, the Sendai Framework for Disaster Risk Reduction, the Small Island Developing States Accelerated Modalities of Action (SAMOA) Pathway, and other global, regional and national development agendas and initiatives.

Place in space

Thanks to the science of geodesy (and highly qualified geodesists), it is possible to observe and monitor the *place in space* of both the Earth and satellites. This includes monitoring the Earth's position, shape, size, orientation, and gravity field, and how these parameters change over time. In the case of satellites, it refers to monitoring their position as they orbit the Earth and observing the changes between their predicted orbit and actual orbit due to things like changes in the Earth's gravity field or solar radiation pressure.

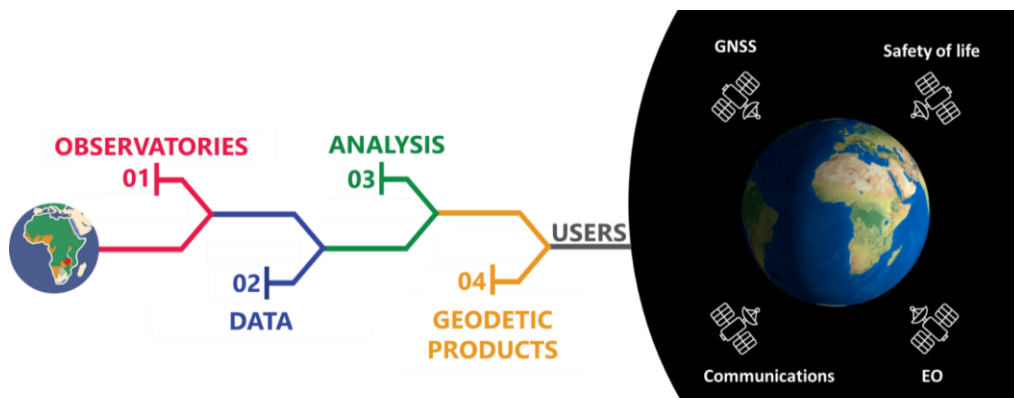


Figure 1: The global geodesy supply chain.

The Earth and satellite *place in space* information are types of geodetic products.

Other important geodetic products include a global coordinate reference frame and a global gravity reference frame, which provide points of reference for measurements (like a zero point on a ruler). It is only by combining all these geodetic products together that people can accurately and reliably use satellite data.

reliably observing and analyzing the Earth and satellites. To measure the constant changes, with the timeliness and level of precision required to produce the geodetic products satellites and users demand, ground observatories and highly qualified people within governments and universities all around the world are needed.

Global geodesy supply chain

Geodetic products are the outputs of the global geodesy supply chain (**Error! Reference source not found.**) which includes:

- ground station observatories owned and operated by mapping agencies, space agencies, universities and research groups, who constantly observe the movement of the Earth and satellites;
- data centres operated by specialists who quality check, store, and archive the data from observatories and make it available to the global geodesy analysis community; and,
- analysis, combination and correlation centres and analysts who translate the raw data into geodetic products.

It is a *global* geodesy supply chain because no single country can fulfill all the requirements of accurately and

Global Geodesy Needs Assessment

The UN-GGCE undertook a thorough *Global Geodesy Needs Assessment*¹ to guide the formulation of everything from the goals to the activities of the *1st Joint Development Plan for Global Geodesy*. The UN-GGCE reviewed and summarized expert views and perspectives from in-person consultation meetings and nine "listening" sessions where the team members listened to the needs of over 550 representatives from 110 Member States and partner organizations around the world. Furthermore, the Global Geodesy Needs Assessment drew on responses and recommendations from other reports and surveys including the UN-GGIM Subcommittee on Geodesy: Global Surveys on Geodetic Reference Frame Competency Surveys (2021 and 2018), UN-GGIM Subcommittee on Geodesy Position Paper on Sustaining the Global Geodetic Reference Frame (2021) and UN-GGIM Subcommittee on Geodesy: Geodetic Infrastructure Working Group Questionnaire (2020).

¹ UN-GGCE, 2024, Global Geodesy Needs Assessment, https://ggim.un.org/UNGGCE/documents/20240509-Global_Geodesy_Needs_Assessment.pdf accessed 28 May 2024.

2.0

1st JOINT DEVELOPMENT PLAN FOR GLOBAL GEODESY

Purpose

The purpose of the *1st Joint Development Plan for Global Geodesy (Joint Development Plan)* is to translate the geodetic needs of Member States and partners into strategic objectives and activities, which, when achieved, will strengthen the global geodesy supply chain.

Guiding Principles

This *Joint Development Plan* embraces guiding principles from the United Nations and other non-government organisations for capacity development, standards and best practices for asset management, best practices for operating supply chains in federated systems, and best practices for program design, management and evaluation. These principles are outlined in further detail below.

Asset and quality management

The proposed activities of the *Joint Development Plan* reflect that the global geodesy supply chain is an ensemble of 'assets' which have significant value and must be managed to ensure they perform at the level required to deliver on Member State requirements. For example, the timing information provided by GNSS satellites is required in some Member States to operate critical national infrastructure. Some Member States have, therefore, called for elements of the global geodesy supply chain that provide geodetic products essential for the operation of GNSS to also be recognized as critical national infrastructure.¹

In recognition of the importance of the supply chain, it is recommended that groups leading activities to strengthen the supply chain refer to the Asset Management (series 15000) and Quality Management

(series 9000) standards published by the International Organization for Standardization (ISO) for guidance. These standards provide recommendations for best practices in the operation of infrastructure and quality management of data services. Such standards are used by asset and quality managers worldwide in sectors such as transport and meteorology.

Operating federated supply chains

The global geodesy supply chain is a federated supply chain. Assets and services of the supply chain are owned and operated by governments, academic and scientific institutions within Member States with admirable coordination effort provided by the International Association of Geodesy (IAG).

The *Joint Development Plan* provides suggested activities across three phases to strengthen the governance of a federated supply chain in a manner commensurate with the risk associated with our growing reliance on it.

Theory of Change

The theory of change was used by the UN-GGCE team to create the *Joint Development Plan*. A theory of change is a method that explains how a given intervention, or set of activities, are expected to lead to a specific change, drawing on a causal analysis based on available evidence.

A theory of change was preferred for many reasons. Firstly, it is well suited for complex problems with many factors and layers which are deeply embedded. It assists with the identification of root causes of the challenges and how they influence or depend on each other. Furthermore, it helps to prioritise when and where specific effort or interventions are needed.

Secondly, a theory of change provides a framework for monitoring, evaluation and learning both within and between programming cycles. By articulating the causes of a development challenge, making assumptions

explicit on how the proposed strategy is expected to yield results, and testing these assumptions against evidence—including what has worked well, or not, in the past—the theory of change helps ensure a sound logic for achieving change.²

Thirdly, the theory of change is, the theory of change is increasingly being utilized as a means for developing and managing partnerships and partnership strategies. This is particular important for the broad, and growing number of geodesy stakeholders to ensure clear articulation of the purpose of the *Joint Development Plan* and clear communication to beneficiaries, stakeholders, donors, governments and other partners.

Further information regarding the UN-GGCE's theory of change and logical framework development can be found as Annex's to this *Joint Development Plan*.

United Nations resolutions, directives, guidelines and procedures

The *Joint Development Plan* also reflects United Nations resolutions, directives, guidelines, and procedures for guidance ensuring alignment with:

- UN General Assembly resolution 69/266 entitled 'A global geodetic reference frame for sustainable development'.
- UN-GGIM Subcommittee on Geodesy 'Position Paper on Sustaining the GGRF' (E-C.20-2021-7-Add-2).
- The 2030 Agenda for Sustainable Development
- The Paris Agreement (on Climate Change).
- Sendai Framework for Disaster Risk Reduction.
- Habitat III: The New Urban Agenda.
- Small Island Developing States Accelerated Modalities of Action Pathway (SAMOA Pathway).
- Regional agendas such as the INSPIRE Directive (European Union) and Agenda 2063: the future we want for Africa.
- UN Integrated Geospatial Information Framework (UN-IGIF) and the Diagnostic Tools used to develop Country Action Plans.
- UN Guidelines on Infrastructure management and development, including UN Guidelines on Infrastructure Asset Management and UNEP

International Good Practice Principles for Sustainable Infrastructure.

- Member State development priorities and strategies, where applicable.
- Best practice program design, monitoring, and evaluation.

It is important to consider this information as potential donors or funding agencies aim to:

- Maximise impact by ensuring alignment with regional and global initiatives. This requires the identification of long-, medium- and short-term objectives, impacts, and outcomes.
- Minimize duplication of effort.
- Ensure transparency through monitoring and evaluation processes.

² <https://unsdg.un.org/sites/default/files/UNDG-UNDAF-Companion-Pieces-7-Theory-of-Change.pdf>

Strengthening the global geodesy supply chain in a phased approach

The *Joint Development Plan* outlines how to strengthen the supply chain in three phases; with each subsequent phase building on the activities of the previous phase.

Phase 1: Avoid further degradation of the global geodesy supply chain

In Phase 1, Member States and partners are urged to take action to ensure:

- the accuracy of geodetic products essential for Member States operational requirements does not degrade from current levels³ to support the current positioning, navigation, and timing requirements of Member States; and
- current geodesy capacity and capability is retained, especially in developing countries.

The need for immediate action on the activities in Phase 1 is in response to weaknesses in the global geodesy supply chain, which were identified in the Global Geodesy Needs Assessment¹ and UN-GGCE Hidden Risk report⁴.

It is proposed that Member States and partners achieve this by:

- improving the evidence of the importance of geodesy to people's daily lives;
- growing awareness of the weaknesses in the global geodesy supply chain across government agencies and industries that are reliant on it; and,
- improving national governance arrangements and developing a country-level work plan to manage the strategic, operational, and technical risks associated with the global geodesy supply chain.

Phase 2: A robust global geodesy supply chain

In Phase 2 Member States and partners are advised to build on the foundations in Phase 1 and enhance the

reliability and integrity of geodetic products (while maintaining the accuracy achieved in Phase 1) essential for Member States operational requirements.

The transition from Phase 1 to Phase 2 will be delivered through enhanced: coordination, capacity, ground observatory network, data centres, and analysis capability.

A robust geodesy supply chain will have a governance model where Member States manage the federated supply chain in a manner commensurate with the risk and consciously contribute to the production of geodetic products, in particular the International Terrestrial Reference Frame (ITRF) and the global geoid as a reference for height determination. Enhanced coordination will ensure clear responsibility of specific roles, avoid duplication of effort and optimise resources.

Phase 2 will enable stronger foundations for Member State development agendas and industry requirements due to improved data integrity, observatory network uptime, and reliability of geodetic products in developing countries and remote regions. Furthermore, the activities in Phase 2 will improve the efficiency and resilience of critical national infrastructure systems such as power supplies, finance, telecommunications and emergency services.

Phase 3: A next-generation global geodesy supply chain

The transition from Phase 2 to Phase 3 will require research and development and strong collaboration between Member States and partners. Phase 3 will build on the outcomes delivered in Phase 2 and provide improved *accuracy* of geodetic products required to address scientific and societal challenges.

A next-generation global geodesy supply chain would enable millimetre-level monitoring of sea-level changes over decades, which is critical in monitoring the causes and effects of climate change. Furthermore, it would meet the emerging needs for satellite operations, autonomous transportation, space exploration, astronomy, and interplanetary travel.

³ UN-GGCE, 2024, Expert Consultation meeting on Strengthening the Global Geodesy Supply Chain, https://ggim.un.org/UNGGCE/Expert_Consultation/Summary_of_Decisions_and_Meeting_Notes-v2.pdf accessed 28 May 2024.

⁴ <https://ggim.un.org/UNGGCE/#documents>

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PARTNERSHIPS FOR ACTION

The activities of the *Joint Development Plan* are beyond the scope of any single agency to tackle alone. The goals and impacts will only be realised if Member States, the UN-GGCE and partners take responsibility to lead, collaborate and deliver on the activities outlined below. The partners involved include but are not limited to those shown below.



International Association of Geodesy (IAG) (including its Services and Global Geodetic Observing System)	Member State geodesy, mapping, defence and policy agencies
UN-GGCE International Advisory Committee	Space agencies
UN-GGIM Committee of Experts and Expert and Working Groups	UN-GGIM Subcommittee on Geodesy
International Federation of Surveyors (FIG)	UN-GGIM regional geodesy working groups
International Hydrographic Organization (IHO)	UN-GGCE Partners
International Telecommunication Union (ITU)	Development agencies
World Meteorological Organization (WMO)	Local leaders
International Organization for Standardization Technical Committee 211 (ISO TC/211)	Philanthropic foundations
UN-GGIM Thematic Networks	Industry leaders and private sector
UN Centres of Excellence	Academic and research institutions
	Media

GOALS AND IMPACTS

3 GOALS MANY IMPACTS

The *Joint Development Plan* has three overarching Goals which provide a framework to strengthen the global geodesy supply chain through the provision of strong evidence and outreach to fund ground observatories, data centres, analysis centres, and grow capacity.

In combination, the Goals capture the whole-of-system approach required to create a society that values and prioritizes policy investments in geodesy as being essential to everyday life.

The three goals are:

Goal 1: Geodesy is recognized as being essential to the operation of critical infrastructure and economic development.

Which will provide impacts such as:

- continuity of service to telecommunications, banking, navigation, and other critical infrastructure services;
- defensible revenue raising from land tax;
- land as a reliable asset for loans; and,
- efficient and resilient operation of critical infrastructure.

Goal 2: The global geodesy supply chain is robust and sustainable to support efficient and effective decision-making.

Which will provide impacts such as:

- improved mitigation of risks from hazards such as earthquakes, volcanoes and landslides to communities and infrastructure;
- high integrity intelligent transport systems for collision avoidance;
- more efficient route planning for road, marine, air, and interplanetary travel; and,
- accurately monitored and quantifiable changes in water-level through time.

Goal 3: Geodesy is applied to accelerate the achievement of the UN Sustainable Development Goals.

Which will provide impacts such as:

- continuous, accurate, and reliable monitoring of environmental change through time;
- assisting with the sustainable management of natural resources; and,
- assisting to make cities and human settlements inclusive, safe, resilient, and sustainable.

OBJECTIVES, OUTCOME AND ACTIVITIES

13 OBJECTIVES

118 ACTIVITIES

The three Goals will be realized through the following **Strategic Objectives** and **Outcomes** delivered by the proposed **Activities** of the Member States, UN-GGCE and partners.

Phase 1: Avoid further degradation of the global geodesy supply chain

Objective 1.1 – Member States engaged in geodesy governance

Outcomes

- 1.1.1 Member States have improved governance arrangements within their country including a workplan to manage strategic, operational, and technical geodetic risks.
- 1.1.2 Governments, science organizations, industry, and universities understand their roles in the global geodesy supply chain, as well as how they relate to other elements of the chain.
- 1.1.3 Member States understand their dependency, on the global geodesy supply chain, as well as the impact of loss due to failure or degradation of the global geodesy supply chain.
- 1.1.4 Risks are beginning to be mitigated.

Proposed Activities of Member States

1. Create a or strengthen existing country level geodesy working group including representatives from government (science, policy, defence), industry and academia.
2. Lead the development and implementation of a country level strategy and action plan to:
 - Assess strategic, operational and technical geodetic risks associated with weaknesses in the global geodesy supply chain.
 - Increase awareness of the global geodesy supply chain.

- Address risks that, if realised, would have significant economic, social, and environmental consequences.

Proposed Activities of UN-GGCE

3. Engage with Member State representatives to form, and assist in the development of, country level working groups, strategies and action plans.

Proposed Activities of Partners

4. Engage with Member State representatives to form, and actively participate in, country level geodesy working groups.

How to read the Timeline Tables

The timeline tables contain the names of a group (or groups) that has committed to lead or assist with the proposed activity and when they plan to undertake the work.

Activity rows (shown in red) reflect that no group has responsibility to perform these activities which puts future Phases at risk of not being realized.

Activity rows (shown in blue) are proposed activities for Member States to lead, or are reliant on Member States to initiate before partners can be involved.

Member States do not have to complete this table, however, they are encouraged to use the Objectives, Outcomes, Activities and tables in the Joint Development Plan to as guidance for their country level geodesy working groups.

If Member States do not perform these activities, it puts future Phases at risk of not being realized.

Commented [N82]: Row four highlights the partners who have already offered to assist with country level working groups. The UN-GGCE encourages other partners to nominate themselves to be listed here. The current number of partners is insufficient.

Timeline and Committed Parties: Objective 1.1

	Q4 2024	2025 (Q1-Q2)	2025 (Q3-Q4)	2026	Beyond 2026
1					
2					
3	UN-GGCE	UN-GGCE	UN-GGCE	UN-GGCE	UN-GGCE
4	IAG, Esri	IAG, RMIT University, Esri	IAG, RMIT University, Esri	IAG, RMIT University, Esri	IAG, RMIT University, Esri

Objective 1.2 – Maintain current accuracy and reliability of geodetic products

Outcomes

- 1.2.1 The reliability and accuracy of geodetic products is maintained at current levels.
- 1.2.2 Member States have ensured the ongoing operation of:
 - existing ground observatory stations; and,
 - data, analysis, combination, correlation and geodetic product development centres.
- 1.2.3 Member States are able to maintain their current Position, Navigation and Timing operational requirements.
- 1.2.4 Where possible, Member States make geodetic data Findable, Accessible, Interoperable and Reusable (FAIR).
- 1.2.5 Where possible, Member States make geodetic information available in the ISO Geodetic Register and European Petroleum Survey Group (EPSG) register.

Proposed Activities of Member States

- 5. Formalize long term agreements for the operation and maintenance (including people) of:
 - existing ground observatory stations; and,
 - data, analysis, combination, correlation and geodetic product development centres.
- 6. Where possible, make geodetic products available under Findable, Accessible Interoperable and Reusable (FAIR) principles⁵.

- 7. Assist partners to establish regional hubs to host, and share, geodetic equipment and products, and provide technical support.
- 8. Where possible, provide redundant GNSS equipment to regional hubs for other Member States to use.

Proposed Activities of UN-GGCE

- 9. Assist partners to establish regional hubs to host, and share, geodetic equipment and products, and provide technical support.
- 10. Develop guidelines to assist Member States in making geodetic products available under FAIR principles.

Proposed Activities of Partners

- 11. Establish regional hubs to host, and share, geodetic equipment and products, and provide technical support.
- 12. Where possible, provide redundant GNSS equipment to regional hubs for other Member States to use.
- 13. Where possible, make geodetic products available under FAIR principles.

Timeline and Committed Parties: Objective 1.2					
	Q4 2024	2025 (Q1-Q2)	2025 (Q3-Q4)	2026	Beyond 2026
5					
6					
7					
8					
9		UN-GGCE	UN-GGCE	UN-GGCE	
10		UN-GGCE	UN-GGCE	UN-GGCE	
11	IAG	IAG	IAG	IAG	IAG
12					
13	IAG	IAG	IAG	IAG	IAG

Commented [NB3]: The UN-GGCE appreciates the support from IAG as a partner to deliver this, however, more support is needed. This row therefore remains red.

⁵ <https://www.nature.com/articles/sdata201618>

Objective 1.3 – Decision-makers are convinced of importance of geodesy

Outcomes

- 1.3.1 Evidence and communication products are available to Member States and partners which describe the importance of the global geodesy supply chain.
- 1.3.2 Member States are successful in accessing resources to avoid further degradation of the global geodesy supply chain.

Proposed Activities of Member States

- 14. Use the evidence provided by the UN-GGCE to develop country specific business cases (with consideration of current government priorities) to access resources to avoid further degradation of the global geodesy supply chain.
- 15. Discuss business cases and gain support from members of their country geodesy working group (see Activity 1.1.1).
- 16. Submit business cases at opportune times to maximize chances of success.

Proposed Activities of UN-GGCE

- 17. Develop a Hidden Risk report and policy brief that describes how weaknesses in the global geodesy supply chain pose risk to economic development and the operation of critical national infrastructure.
- 18. Develop policy briefs that describe the importance of geodesy for monitoring climate change and mitigating natural hazards.
- 19. Develop a State of Geodesy 2024 report which highlights current state of the elements of the global geodesy supply chain including weaknesses and risks.

Proposed Activities of Partners

- 20. Develop and provide evidence to the UN-GGCE that demonstrates how critical the global geodesy supply chain is to their business.

Commented [NB4]: The UN-GGCE appreciates the support from IAG as a partner to deliver this, however, more support is needed. This row therefore remains red.

Timeline and Committed Parties: Objective 1.3					
	Q4 2024	2025 (Q1-Q2)	2025 (Q3-Q4)	2026	Beyond 2026
14					
15					
16					
17	UN-GGCE				
18		UN-GGCE	UN-GGCE	UN-GGCE	UN-GGCE
19	UN-GGCE				
20		IAG	IAG	IAG	IAG

Objective 1.4 – Develop and retain a talented and diverse workforce in areas it is urgently needed

Outcomes

- 1.4.1 The capacity development⁶ requirements of Member States are known.
- 1.4.2 Capacity development programs are designed and delivered to a diverse group of participants to meet Member State needs.
- 1.4.3 Capacity development material is made freely available online.
- 1.4.4 Member States are receiving assistance to improve geodesy capacity.
- 1.4.5 Partners are assisting in the delivery of geodetic capacity development.
- 1.4.6 New generations of geodetic researchers are being trained who will develop new methodologies and technologies.

Proposed Activities of Member States

- 21. Develop and strengthen formal geodesy training programs in country or in partnership with other countries.
- 22. Prioritise training new staff members with geodesy skills to transfer knowledge from existing staff.
- 23. Prioritise hiring of geodesists into science and defence organisations.
- 24. Work with the university and industry sectors to develop or strengthen formal geodesy training programs.
- 25. Provide scholarships or grants for geodesy research and development in universities.

Proposed Activities of UN-GGCE

- 26. Develop and deliver rationalizations or justification specifically aimed at universities to encourage investment in delivering geodesy programs.
- 27. Develop and deliver a communications package which describes the benefits of a career in geodesy.

- 28. Identify Member State capacity development needs in Global Geodesy Needs Assessment and prioritize the needs by region and Member State.
- 29. Design and deliver capacity development training program for each region with time allocated to addressing specific Member State geodetic needs. Ensure consideration of participants technical skills and diversity.
- 30. Make material from capacity development workshops, and other geodetic education material available online and in multiple languages (where possible).
- 31. Support initiatives of Member States who are advocating for careers in geodesy.

Proposed Activities of Partners

- 32. Participate in UN-GGCE led regional capacity development training.
- 33. Provide geodesy capacity development workshops in conjunction with industry events.
- 34. Make geodesy capacity development materials available online and inform the UN-GGCE about it.
- 35. Produce high-quality capacity development material.
- 36. Provide scholarships or grants for geodesy research and development in universities.

Commented [NB5]: The UN-GGCE appreciates the support from IAG, RMIT and Esri as partners to deliver this, however, more support is needed. Rows 30-34 therefore remains red.

⁶ Capacity development is defined by the United Nations Development Group (UNDG) as the process whereby people, organizations and society as a whole unleash, strengthen, create, adapt and maintain the ability to manage their affairs

over time. In the context of this report, capacity development refers to training of professionals to operate the current global geodesy supply chain and future generations of geodesists who will research and develop new methodologies and technologies.

Timeline and Committed Parties: Objective 1.4

	Q4 2024	2025 (Q1-Q2)	2025 (Q3-Q4)	2026	Beyond 2026
21					
22					
23					
24					
25					
26		UN-GGCE			
27			UN-GGCE		
28	UN-GGCE				
29	UN-GGCE	UN-GGCE	UN-GGCE		
30	UN-GGCE	UN-GGCE	UN-GGCE	UN-GGCE	UN-GGCE
31	UN-GGCE	UN-GGCE	UN-GGCE	UN-GGCE	UN-GGCE
32		IAG, Esri	IAG, RMIT University, Esri	IAG, RMIT University, Esri	IAG, RMIT University, Esri
33		IAG, Esri	IAG, RMIT University, Esri	IAG, RMIT University, Esri	IAG, RMIT University, Esri
34		IAG, Esri	IAG, RMIT University, Esri	IAG, RMIT University, Esri	IAG, RMIT University, Esri
35		IAG, Esri	IAG, Esri	IAG, Esri	IAG, Esri
36					

Objective 1.5 – The value of geodesy is

Commented [NB6]: The UN-GGCE appreciates the support from IAG and Esri as partners to deliver this, however, more support is needed. UN-GGCE Partner activities therefore remain red.

Timeline and Committed Parties: Objective 1.5

	Q4 2024	2025 (Q1-Q2)	2025 (Q3-Q4)	2026	Beyond 2026
37					
38					
39		UN-GGCE			
40	UN-GGCE	UN-GGCE	UN-GGCE	UN-GGCE	UN-GGCE
41	Esri	Esri	IAG, Esri	IAG, Esri	IAG, Esri
42	Esri	Esri	IAG, Esri	IAG, Esri	IAG, Esri
43	Esri	Esri	IAG, Esri	IAG, Esri	IAG, Esri

understood by society and industry

Outcomes

- 1.5.1 All groups involved in the implementation of the Joint Development Plan understand each other's role and messaging about the plan is clear.
- 1.5.2 Clear and concise communication material is available and being used to demonstrate the value of geodesy.
- 1.5.3 Member States, industry and the public have an improved understanding of their dependence on geodesy.
- 1.5.4 Industry plays a stronger advocacy role.

Proposed Activities of Partners

- 41. Develop stories which demonstrate the value of geodesy in industries such as agriculture, health services, urban planning, land administration and mining.
- 42. Use stories to demonstrate the benefits of strengthening the global geodesy supply chain in a country or region to improve resourcing for the global geodesy supply chain.
- 43. Participate in the development of a public awareness campaign about the importance of geodesy in peoples' daily lives (related to Activity 38).

Proposed Activities of Member States

- 37. Develop national and regional stories which demonstrate the value of geodesy to government including the operation of critical infrastructure, environmental monitoring, and natural hazard mitigation.
- 38. Use stories to demonstrate the benefits of strengthening the global geodesy supply chain in a country or region to improve resourcing for the global geodesy supply chain.

Proposed Activities of UN-GGCE

- 39. Develop a public awareness campaign about the importance of geodesy and its applications.
- 40. Assist Member States and partners to develop stories about the global geodesy supply chain.

Phase 2: A robust global geodesy supply chain

Objective 2.1 – Geodetic products meet Member State accuracy, reliability and integrity standards to deliver on operational requirements

Outcomes

- 2.1.1 A jointly designed robust global geodesy supply chain including ground observing stations, technology, analysis and capacity requirements.
- 2.1.2 A jointly developed implementation plan for a robust global geodesy supply chain.
- 2.1.3 Development and sustainment of a robust global geodesy supply chain.
- 2.1.3 The reliability, accuracy and integrity of geodetic products meet civilian, defence and industry operational requirements.

Proposed Activities of Member States

- 44. Participate in the design process and implementation process of the robust global geodesy supply chain coordinated by the UN-GGCE.
- 45. Contribute (financially or in-kind) to the geodetic research and development required to achieve a robust global geodesy supply chain.
- 46. Financially contribute to the construction and sustainment of the robust global geodesy supply chain.

Proposed Activities of UN-GGCE

- 47. Design a draft robust global geodesy supply chain in consultation with Member States and partners which includes:
 - ground observatory stations; and,
 - data, analysis, combination, correlation and geodetic product development centres.
- 48. Gather expert views and perspectives on the draft robust global supply chain.
- 49. Host expert meetings, as required, to bring together government (science, policy and defence) and industry for discussions on developing a robust supply chain.
- 50. Finalise a design, supported with evidence, of a robust supply chain.
- 51. Develop an implementation plan in consultation with Member States and partners of a robust global geodesy supply chain.

- 52. Gather expert views and perspectives on the robust implementation plan.

Proposed Activities of Partners

- 53. Participate in the design process and implementation process of the robust global geodesy supply chain coordinated by the UN-GGCE.
- 54. Contribute (financially or in-kind) to the geodetic research and development required to achieve a robust global geodesy supply chain.
- 55. Financially contribute to the construction and sustainment of the robust global geodesy supply chain.

Commented [NB7]: The UN-GGCE appreciates the support from IAG and Esri as partners to deliver this, however, more support is needed. UN-GGCE Partner activities therefore remain red.

Timeline and Committed Parties: Objective 2.1					
	Q4 2024	2025 (Q1-Q2)	2025 (Q3-Q4)	2026	Beyond 2026
44					
45					
46					
47	UN-GGCE	UN-GGCE			
48	UN-GGCE	UN-GGCE			
49		UN-GGCE	UN-GGCE		
50			UN-GGCE		
51				UN-GGCE	
52				UN-GGCE	
53	IAG	IAG	IAG	IAG	
54	IAG	IAG	IAG	IAG	
55	IAG	IAG	IAG	IAG	

Commented [NB88]: The UN-GGCE appreciates the support from IAG as partners to deliver this, however, more support is needed. UN-GGCE Partner activities therefore remain red.

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Objective 2.2 – Global geodesy supply chain governance is commensurate with

Timeline and Committed Parties: Objective 2.2

	Q4 2024	2025 (Q1-Q2)	2025 (Q3-Q4)	2026	Beyond 2026
56					
57					
58					
59					
60		UN-GGCE	UN-GGCE		
61			UN-GGCE	UN-GGCE	UN-GGCE
62				UN-GGCE	UN-GGCE
63				UN-GGCE	UN-GGCE
64	IAG	IAG	IAG	IAG	IAG
65	IAG	IAG	IAG	IAG	IAG
66	IAG	IAG	IAG	IAG	IAG

risk

Outcomes

- 2.2.1 Member States have regional and global geodesy governance frameworks to:
- ensure the reliable operation of the supply chain;
 - create and share geodetic products; and,
 - manage strategic, operational and technical risks;
- 2.2.2 Member States are actively participating in regional and global geodesy governance frameworks to sustain a robust global geodesy supply chain.

Proposed Activities of Member States

56. Implement a standing item on UN-GGIM regional committee agendas on regional and global geodesy governance.
57. Work through UN-GGIM regional committees to help manage strategic, operational and technical risks
58. Actively participate in the global geodesy governance framework discussions organised by the UN-GGCE.
59. Work with other Member States and the UN-GGCE to reach a consensus on the design and implementation of a global geodesy governance framework.

Proposed Activities of UN-GGCE

60. Develop options for a global geodesy governance framework, accountable for operational and scientific performance, and risks.
61. Gather expert views and perspectives on global geodesy governance framework options.
62. Coordinate efforts of Member States to reach a consensus on the design and implementation of a global geodesy governance framework.
63. Work towards the establishment a global geodesy governance framework based on the needs of Member States.

Proposed Activities of Partners

64. Participate in regional governance forum/s to manage strategic, operational and technical risks.
65. Participate in the consultation meetings discussing the establishment of a global geodesy governance framework.
66. Share information and insights across regional committees to help manage strategic, operational and technical risks.

Commented [NB9]: The UN-GGCE appreciates the support from IAG as partners to deliver this, however, more support is needed. UN-GGCE Partner activities therefore remain red.

Objective 2.3 – Decision-makers are convinced of the importance of a robust supply chain

Outcomes

- 2.3.1. Evidence of the importance of making the global geodesy supply chain more robust is available so Member States can develop business cases which are understood by donors.
- 2.3.2. Business cases (based on evidence) for making the global geodesy supply chain more robust are approved by decision makers or funding agencies.
- 2.3.3. Member States provide resources to make the global geodesy supply chain more robust.
- 2.3.4. Member States designate, and resource, elements of the global geodesy supply chain as critical national infrastructure (or something similar).

Proposed Activities of Member States

- 67. Develop country specific evidence (e.g. policy brief, business cases, stories) to assist in getting additional resources for a robust global geodesy supply chain.
- 68. Use evidence to influence decision makers to transition to a robust global geodesy supply chain.
- 69. Where possible, designate, and resource, elements of the global geodesy supply chain as critical national infrastructure (or something similar).
- 70. Where possible, share evidence, and stories of success and failure (with respect to getting resources), with UN-GGCE to share with other Member States and partners.

Proposed Activities of UN-GGCE

- 71. Assist Member States develop evidence (e.g. policy brief, business cases, stories) to assist Member States in getting resources they are responsible for in a robust global geodesy supply chain.
- 72. Provide evidence which explains why the global geodesy supply chain is critical infrastructure.

Proposed Activities of Partners

- 73. Assist Member States in the development and advocacy of business cases and stories to assist in convincing decision makers to transition to a robust supply chain.
- 74. Curate evidence (e.g. policy brief, business cases, stories) to assist in getting resources they are responsible for in a robust global geodesy supply chain.
- 75. Use evidence to influence decision makers to transition to a robust global geodesy supply chain.
- 76. Where possible, share evidence, and stories of success and failure (with respect to getting resources), with UN-GGCE to share with other Member States and partners.

Commented [NB10]: The UN-GGCE appreciates the support from IAG as partners to deliver this, however, more support is needed. UN-GGCE Partner activities therefore remain red.

Timeline and Committed Parties: Objective 2.3

	Q4 2024	2025 (Q1-Q2)	2025 (Q3-Q4)	2026	Beyond 2026
67					
68					
69					
70					
71		UN-GGCE	UN-GGCE		
72			UN-GGCE	UN-GGCE	
73		IAG	IAG		
74		IAG	IAG		
75		IAG	IAG		
76			IAG	IAG	IAG

Objective 2.4 – Implement open sharing of geodetic data, products and standards on a voluntary basis

Outcomes

2.4.1 More geodetic data is Findable, Accessible, Interoperable and Reuseable (FAIR).

Proposed Activities of Member States

- 77. Where possible, make geodetic data and products open and FAIR.
- 78. Ensure metadata records comply with international standards.
- 79. Document and share case studies of data sharing, the benefits that have arisen, and strategies for overcoming barriers.

Proposed Activities of UN-GGCE

- 80. Develop a data sharing policy template for Member States to use in preparing their national data sharing policies.
- 81. Promote open data policies to make geodetic data available to the public, researchers, and other industries.

Proposed Activities of Partners

- 82. Where possible, make geodetic data and products open and FAIR.
- 83. Where possible, assist in the development of open standards.
- 84. Where possible, provide geodetic data and products available in open standards.

Commented [NB11]: The UN-GGCE appreciates the support from IAG and Esri as partners to deliver this, however, more support is needed. UN-GGCE Partner activities therefore remain red.

Timeline and Committed Parties: Objective 2.4					
	Q4 2024	2025 (Q1-Q2)	2025 (Q3-Q4)	2026	Beyond 2026
77					
78					
79					
80					
81			UN-GGCE	UN-GGCE	
82	IAG	IAG	IAG	IAG	IAG
83	IAG, Esri	IAG, Esri	IAG, Esri	IAG, Esri	IAG, Esri
84	IAG, Esri	IAG, Esri	IAG, Esri	IAG, Esri	IAG, Esri

Objective 2.5 – Member States have a modern Geospatial Reference System⁷

Outcomes

- 2.5.1 Member States have, or are transitioning to, a modern Geospatial Reference System (GRS).
- 2.5.2 Member States transitioning to a modern GRS have implementation plans describing how a modern GRS will be realized (including resourcing, technical and stakeholder engagement requirements).
- 2.5.3 Member States have financial support from their country needed to implement a modern GRS.
- 2.5.4 Where possible, Member States make their GRS information available in the ISO Geodetic Register and EPSG register.

Proposed Activities of Member States

- 85. Review the current GRS in collaboration with the Member State geodesy working group and determine if any elements need to be modernised to meet the needs of the country.
- 86. For Member States transitioning to a modern GRS, develop a country level roadmap, in collaboration with the Member State geodesy working group.
- 87. For Member States transitioning to a modern GRS, develop a country level implementation plan in collaboration with the Member State geodesy working group describing how it will be realized (including resourcing, technical and stakeholder engagement requirements).
- 88. For Member States transitioning to a modern GRS, seek assistance from the UN-GGCE to assist with the implementation of a modern GRS.
- 89. For Member States transitioning to a modern GRS, develop a business case to seek resourcing needed to fund the development, implementation and communication of a modern GRS.
- 90. Make GRS information available in the ISO Geodetic Register and EPSG register.
- 91. Loan or donate geodetic equipment to regional hubs.

Proposed Activities of UN-GGCE

- 92. Provide online webinar series on what a modern GRS is and how to develop it.
- 93. Provide capacity development workshops to assist countries develop a modern GRS.
- 94. Provide a template document which describes the steps countries can go through to implement a modern GRS.
- 95. Assist, where resources are available, the activities of Member States to implement a modern GRS.

Proposed Activities of Partners

- 96. Loan or donate geodetic equipment to regional hubs.
- 97. Provide experts to support capacity development workshops.
- 98. Support representatives from developing countries with formal education opportunities.
- 99. Assist Member States to include GRS information in the ISO Geodetic Register and EPSG register.

Commented [NB12]: The UN-GGCE appreciates the support from IAG, RMIT and Esri as partners to deliver this, however, more support is needed. UN-GGCE Partner activities therefore remain red.

⁷ A Geospatial Reference System includes geometric datums (e.g. geocentric datums) and physical datums (e.g. height datums), models (e.g. geoid models), transformation parameters and

standards. A modern GRS has a geometric datum aligned to ITRF and physical datum which has a well-defined connection to a global gravity model.

Timeline and Committed Parties: Objective 2.5

	Q4 2024	2025 (Q1-Q2)	2025 (Q3-Q4)	2026	Beyond 2026
85					
86					
87					
88					
89					
90					
91					
92	UN-GGCE				
93		UN-GGCE	UN-GGCE	UN-GGCE	UN-GGCE
94		UN-GGCE			
95	UN-GGCE	UN-GGCE	UN-GGCE	UN-GGCE	UN-GGCE
96					
97	IAG, Esri	IAG, RMIT University, Esri	IAG, RMIT University, Esri	IAG, RMIT University, Esri	IAG, RMIT University, Esri
98		RMIT University	RMIT University	RMIT University	RMIT University
99	Esri	Esri	Esri	Esri	Esri

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Objective 2.6 – Member States are

Timeline and Committed Parties: Objective 2.6					
	Q4 2024	2025 (Q1-Q2)	2025 (Q3-Q4)	2026	Beyond 2026
100					
101		UN-GGCE			
102	UN-GGCE	UN-GGCE	UN-GGCE	UN-GGCE	UN-GGCE
103	IAG	IAG	IAG	IAG	IAG

developing and maintaining regional reference frames

Outcomes

- 2.6.1 Member States are engaged in regional collaboration to develop and maintain regional reference frames.
- 2.6.2 Member States regional organizations are receiving the support needed to develop / maintain regional reference frames.
- 2.6.3 Changes in the Earth are monitored in more detail and with greater accuracy.

Proposed Activities of Member States

- 100. Create and sustain regional working groups to govern the establishment and maintenance of regional reference frames responsible for providing:
 - o A clear description of why a regional reference frame is important.
 - o A regional Central Bureau, which is resourced, to coordinate efforts.
 - o Data processing and analysis capability.
 - o Sharing and communication of geodetic data and results.

Proposed Activities of UN-GGCE

- 101. Prepare and share information describing the benefits of a regional reference frame.
- 102. Support Member States, as appropriate, with the establishment and maintenance of regional reference frames.

Proposed Activities of Partners

- 103. Support Member States, as appropriate, with the establishment and maintenance of regional reference frames.

Commented [NB13]: The UN-GGCE appreciates the support from IAG, as partners to deliver this, however, more support is needed. UN-GGCE Partner activities therefore remain red.

Phase 3: A next-generation global geodesy supply chain

Objective 3.1 – Decision-makers are convinced of the importance of a next-generation supply chain

Outcomes

- 3.1.2 Evidence supporting the transformation to a next-generation global geodesy supply chain is easily understood by decision makers.
- 3.1.3 Approved business cases for transforming to a next generation global geodesy supply chain.
- 3.1.4 Increased investment by decision makers to transform the global geodesy supply chain.

Proposed Activities of Member States

- 104. Develop evidence (e.g. policy brief, business cases, stories) to assist in getting resources they are responsible for in a next-generation global geodesy supply chain.
- 105. Use evidence to influence decision makers to transition to a next-generation global geodesy supply chain.
- 106. Where possible, share evidence, and stories of success and failure (with respect to getting resources), with UN-GGCE to share with other Member States and partners.

Proposed Activities of UN-GGCE

- 107. Translate Member States description of the requirements of a next-generation supply chain into

- a language decision makers can understand and are likely to support.
- 108. Commission reports demonstrating the potential of next generation technology.
 - 109. Research, develop and exploit next-generation technology opportunities for geodesy.
 - 110. Design a next-generation global geodesy supply chain.

Proposed Activities of Partners

- 111. Provide UN-GGCE with a clear description, and evidence for a next-generation geodesy supply chain.
- 112. Assist in the development of business cases and stories to assist in convincing decision makers to transition from a robust supply chain to a next-generation supply chain.

Commented [NB14]: The UN-GGCE appreciates the support from IAG, as partners to deliver this, however, more support is needed. UN-GGCE Partner activities therefore remain red.

Timeline and Committed Parties: Objective 3.1

	Q4 2024	2025 (Q1-Q2)	2025 (Q3-Q4)	2026	Beyond 2026
104					
105					
106					
107			UN-GGCE	UN-GGCE	
108			UN-GGCE	UN-GGCE	
109			UN-GGCE	UN-GGCE	
110			UN-GGCE	UN-GGCE	
111		IAG	IAG	IAG	IAG
112		IAG	IAG	IAG	IAG

Objective 3.2 – Availability of higher accuracy and stability geodetic products

Outcomes

- 3.2.1 A design, supported with evidence, of a next generation global geodesy supply chain including ground observing stations, technology, analysis and capacity requirements.
- 3.2.2 An International Terrestrial Reference Frame realization with 1 mm accuracy and +/- 0.1 mm/yr stability.
- 3.2.3 An implementation plan which describes how the design of a next generation global geodesy supply chain will be implemented and resourced.
- 3.2.4 Geodetic products accurate and reliable enough to meet high accuracy applications such as sea level rise observation and interplanetary navigation.
- 3.2.5 Globally, there is an adequate formal education program supporting geodetic research and development.

Proposed Activities of Member States

- 113. Provide information to UN-GGCE regarding what are the operational requirements constituting a next-generation global geodesy supply chain.
- 114. In conjunction with the university sector, undertake the geodetic research and development required to sustain and enhance the global geodesy supply chain.
- 115. Provide ongoing and sustainable financial support to the university sector for geodesy training and development programs.
- 116. Where appropriate, support the ESA Genesis mission (and other space missions with similar objectives).

Proposed Activities of UN-GGCE

- 117. Undertake study of the requirements of a next-generation global geodesy supply chain, including identifying gaps between the current state and a next-generation global geodesy supply chain.
- 118. Develop a design, supported with evidence, of a next-generation global geodesy supply chain including ground observing stations, technology, analysis and capacity requirements.
- 119. Where appropriate, support ESA Genesis mission (and other space missions with similar objectives)

- 120. Consult with Member States on the creation of an implementation plan which describes how the design of a next-generation global geodesy supply chain will be implemented and resourced.

Proposed Activities of Partners

- 121. Provide information to UN-GGCE regarding what are the operational requirements constituting a next-generation global geodesy supply chain.
- 122. Undertake the geodetic research and development required to achieve a next-generation global geodesy supply chain or fund partners to do this work.
- 123. Provide ongoing and sustainable financial support to the university sector for geodesy training and development programs.
- 124. In conjunction with the government sector, undertake the geodetic research and development required to sustain and enhance the global geodesy supply chain.
- 125. Where appropriate, support the ESA Genesis mission (and other space missions with similar objectives).

Commented [NB15]: The UN-GGCE appreciates the support from IAG, as partners to deliver this, however, more support is needed. UN-GGCE Partner activities therefore remain red.

Timeline and Committed Parties: Objective 3.2

	Q4 2024	2025 (Q1-Q2)	2025 (Q3-Q4)	2026	Beyond 2026
113					
114					
115					
116					
117				UN-GGCE, IAG?	UN-GGCE, IAG?
118				UN-GGCE, IAG?	UN-GGCE, IAG?
119				UN-GGCE, IAG?	UN-GGCE, IAG?
120				UN-GGCE	UN-GGCE
121		IAG	IAG	IAG	IAG
122		IAG	IAG	IAG	IAG
123		IAG	IAG	IAG	IAG
124					
125					

GOVERNANCE OF THE JOINT DEVELOPMENT PLAN

Operating Plan Governance

The governance of the *Joint Development Plan* will be undertaken by the following people in the following positions / groups.

Senior Responsible Owner (SRO): Head of Office, UN-GGCE

The SRO is accountable for providing the conditions which maximize the success of the implementation of the *Joint Development Plan*. This includes delivering on roles within the responsibility of the UN-GGCE and supporting Member States and partners leading other activities. The SRO also ensures that the Sponsoring Group members have a clear understanding of their roles.

Strategic Advisory Group: UN-GGCE International Advisory Committee

This role represents the independent advisors who are responsible for providing strategic advice and guidance to assist the UN-GGCE in defining the direction of the global geodesy supply chain.

Program Manager: To be determined, UN-GGCE

Oversight delivery of the changes to the global geodesy supply chain. Responsible for the day-to-day management of the *Joint Development Plan*, including the coordination of projects and their interdependencies, risk and budget management, and reporting.

Business Change Manager: To be determined, UN-GGCE

Responsible for realizing measurable benefits as a result of embedding the changes from the *Joint Development Plan* into the regular operations of the global geodesy supply chain.

Program Office and Secretariat: UN-GGCE

The Program Office and Secretariat is accountable for coordinating people and groups involved in the global geodesy supply chain.

Other Advisory Bodies

- UN-GGCE Steering Committee for strategic matters and alignment with UN policies and processes (including financial matters).
- UN Committee of Experts on Global Geospatial Information Management and its Regional Committees for matters of alignment with Member State priorities.
- UN-GGIM Subcommittee on Geodesy, Geospatial Societies, Academic and Industry Partners, for technical matters.
- Donors and Development Partners for further financial matters not covered by the UN-GGCE Steering Committee.
- Other high interest/high influence stakeholders as appropriate.

Reporting Arrangements

Strategic Reporting

Strategic reporting will be provided by UN-GGCE (as the Secretariat and Program Manager for the Joint Development Plan) to the SRO, the Sponsoring Group, Advisory Groups and other stakeholders. The Strategic reporting will be limited to reporting on progress against Strategic Objectives and Outcomes, with a rating and high-level description as follows:

- Strategic Objective
- Short- or medium-term Output
- Rating (as a traffic light)
- Description of any achievements or issues requiring attention of these bodies
- Risks

Strategic Reporting will occur annually.

Operational Reporting

Member States or partners who take responsibility for delivering any projects or activities of the *Joint Development Plan*, will report on progress to the UN-GGCE.

Operational reporting will include a summary including information such as:

- Progress against the indicators for the output
- Key deliverables
- Stories of success or lessons learnt
- Updated timelines
- Budget
- Change in Scope
- Risks
- Any regional or Member State perspectives
- Any other requirements of donors or funders

Operational reports will be delivered every six months.

3.0

STATE OF GEODESY 2024

Introduction

The *State of Geodesy 2024* provides an overview of the current status of the global geodesy supply chain. Based on expert views and contributions from representatives of Member State governments and partners captured in the Global Geodesy Needs Assessment Report (2024)⁸, this summary is vital to keep those responsible for the global geodesy supply chain informed of progress against global indicators, notable weaknesses, and associated risks.

Criteria for assessing

The *State of Geodesy 2024* provides a rating for each of the Strategic Objectives described in the *Joint Development Plan* (see Section 2.0). Each Strategic Objective has been allocated an aggregate rating based on the delivery of the Outcomes against each Strategic Objective.

For example, *Strategic Objective 1.1 - Member States engaged in geodesy governance*, has four Outcomes. The status of *Strategic Objective 1.1* is an aggregate rating of these four Outcomes.

A status of each Strategic Objective can be assessed as being **Good**, **Marginal**, **Inadequate** or **Non-Existent**. Where insufficient data exists, the indicator status is set to **Not Assessed**.



- The trend status (↑ improvement, → steady, ↓ degradation) reflects the anecdotal perspectives of recent change from experts involved in the Global Geodesy Needs Assessment.
- The confidence value reflects the confidence in the data provided for this indicator (✓✓ = **high**, ✓ = **reasonable**, x = **limited**)

⁸ Global Geodesy Needs Assessment

Key challenges

This *State of Geodesy 2024* highlights a number of challenges including:

- **Insufficient evidence** of the importance of resourcing the global geodesy supply chain in ways that decision makers can understand (e.g. societal, environmental and economic benefits realization).
- **Insufficient resources** (dedicated funds and people) to transition to a robust global geodesy supply chain to meet operational requirements for key resource sectors and critical infrastructure.
- **Inadequate governance mechanisms** exist that, whilst being suitable in the pre-digital era, are no longer appropriate in a digitally connected, federated supply chain involving entities managing assets across different levels of government and across public, private, and academic sectors.
- **Decreasing capacity** training opportunities being offered by academic institutions to train geodesy specialists.
- **Lack of awareness** of the reliance that industry; other fields of science; and, the public, have on geodesy.

For a more detailed analysis of the challenges please refer to the following reports published by the UN-GGCE:

Hidden Risk: How weaknesses in the global geodesy supply chain could have catastrophic impacts on critical infrastructure and national economies,
<https://ggim.un.org/UNGGCE/#documents/> accessed 13 June 2024.

Global Geodesy Needs Assessment,
<https://ggim.un.org/UNGGCE/#documents/> accessed 13 June 2024.

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Summary of findings

Phase 1: Avoid further degradation of the global geodesy supply chain	2024 Status	2024 Trend	2024 Confidence
1.1 Member States engaged in geodesy governance		→	✓
1.2 Maintain current accuracy and geodetic products		↓	✓
1.3 Decision-makers are convinced of importance of geodesy		→	✓✓
1.4 Develop and retain a talented and diverse workforce in areas it is urgently needed		↓	✓✓
1.5 The value of geodesy as is understood by society and industry		→	✓✓
Phase 2: A robust global geodesy supply chain			
2.1 Availability of reliable geodetic products		→	✓
2.2 Global governance is commensurate with risk		→	✓✓
2.3 Decision-makers are convinced of the importance of a robust supply chain		→	✓✓
2.4 Implement open sharing of geodetic data, products and standards on a voluntary basis		→	✓
2.5 More Member States adopting a modern Geospatial Reference System		→	✓
2.6 Member States are developing / maintaining regional reference frames		→	✓✓
Phase 3: A next-generation global geodesy supply chain			
3.1 Decision-makers are convinced of importance of a next generation supply chain		→	✓✓
3.2 Availability of higher accuracy and stability geodetic products		→	✓✓

Stronger. Together.

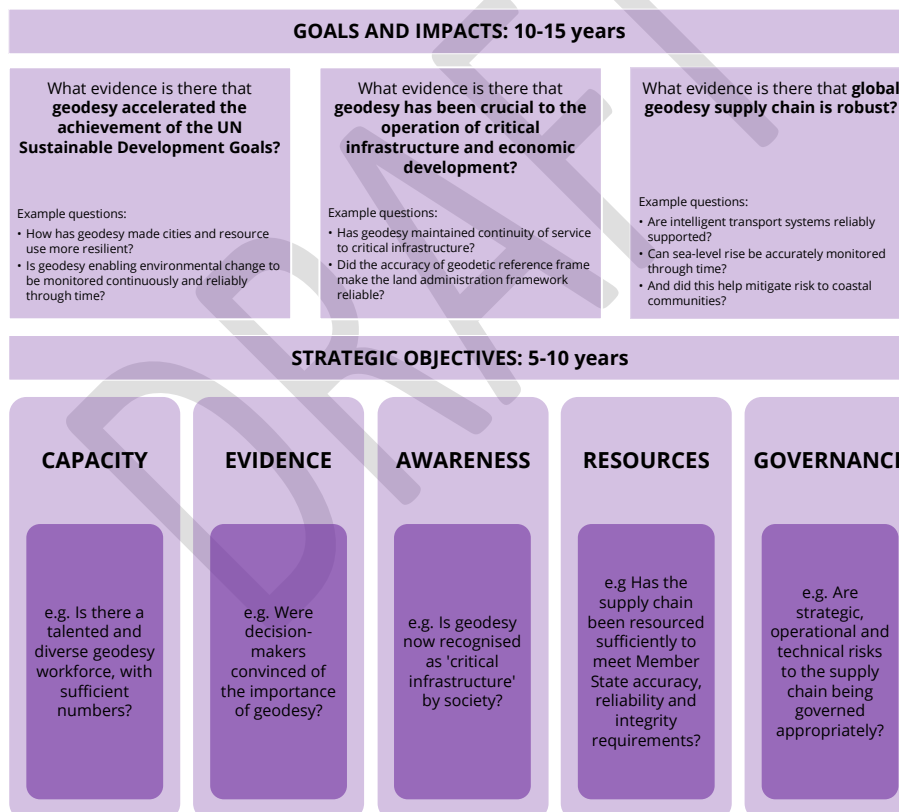
Improvement against each Strategic Objective requires action from Member States, the UN-GGCE and partners. As matters of priority, Member States, the UN-GGCE and partners are:

- *Urged* to stabilize the global geodesy supply chain to avoid degradation or failure of essential geodetic products which support current Position, Navigation and Timing operational requirements.
- *Urged* to define the user requirements of a robust global geodesy supply chain, including data quality and network resilience.
- *Urged* to commission economic studies and reports, which capture the costs and benefits of the global geodesy supply chain to critical infrastructure, earth observation, land administration, telecommunications and general PNT services.
- *Urged* to explore opportunities for knowledge transfer and staff exchanges, as an interim measure to build capacity and capability in developing Member States
- *Encouraged* to create a country level geodesy community of interest to meet, discuss governance, risks and identify potential opportunities for funding within the Member State.
- *Encouraged* to develop communication products, geared towards raising awareness of the importance of geodesy to society.
- *Encouraged* to develop communication products, geared towards raising geodesy as a career pathway for young professionals.
- *Invited* to explore the use cases and emerging technology required to deliver a next-generation global geodesy supply chain.
- *Invited* to consider the benefits of making geodetic data openly accessible.

4.0

EVALUATION

Program evaluation will build upon monitoring the status of Strategic Objectives in the *State of Geodesy* reports. Below is a broad outline of how evaluation will be undertaken. The approach will evaluate the following:



NB: Program monitoring and evaluation will be done by an independent party, hired by the UN-GGCE, specializing in program management monitoring and evaluation.