



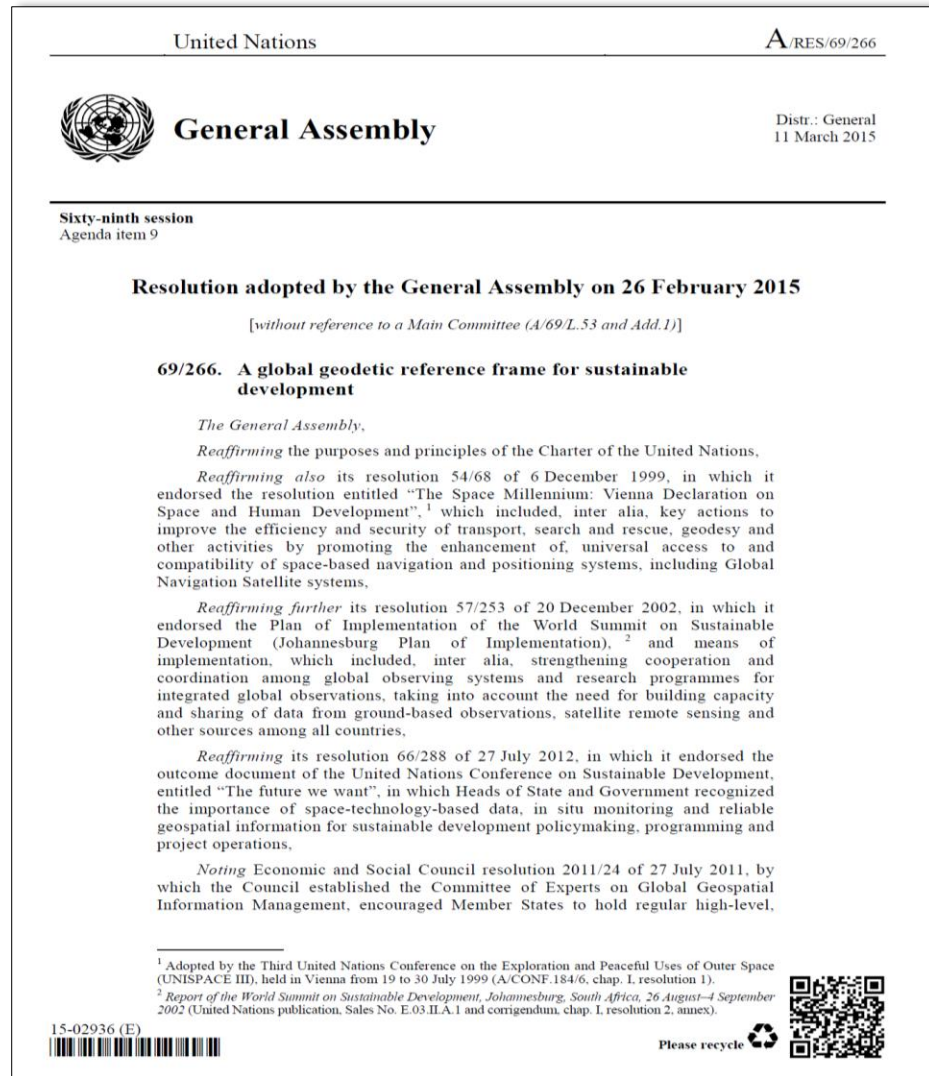
Global Geodesy Supply Chain Maturity Assessment

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Outline

- 1. The UN-GGCE mandate: Resolution 69/266**
- 2. The Global Geodesy Supply Chain (GGSC)**
- 3. GGSC maturity assessment methodology**
- 4. Current state of the GGSC maturity**
- 5. Discussion of the results**
- 6. Summary and conclusions**



- **2011**
Establishment of the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM)
- **2013**
UN-GGIM formulated and facilitated a draft resolution for a Global Geodetic Reference Frame (GGRF)¹
- **2015**
UN General Assembly adopted resolution 69/266 “A Global Geodetic Reference Frame for Sustainable Development”²
- **2016**
UN-GGIM decided to elevate the GGRF Working Group to a Subcommittee on Geodesy
- **2017**
Inauguration of the UN-GGIM Subcommittee on Geodesy
- **2019**
UN-GGIM supported the proposal from the Subcommittee on Geodesy to establish a Global Geodetic Centre of Excellence (UN-GGCE)
- **2020**
UN-GGIM welcomed the offer from Germany to host the UN-GGCE at the UN Campus in Bonn
- **2022**
Signing an agreement between the UN Department of Economic and Social Affairs (DESA) and the German Federal Ministry of the Interior and Community to establish the UN-GGCE
- **2023**
Opening of the UN-GGCE at the UN campus in Bonn, Germany



1. Global Geodetic Reference Frame (GGRF) is a collective term for a framework which allows users to precisely determine and express locations on the Earth, as well as to quantify changes of the Earth in space and time. At present the GGRF is realized through the International Terrestrial Reference Frame (ITRF), International Celestial Reference Frame (ICRF) and physical height systems. For more details see “Frequently Asked Questions and Answers on the Global Geodetic Reference Frame”. Available at https://ggim.un.org/documents/FAQ_UNGGIM-GGRF.pdf, Accessed on 25 August 2025.

2. United Nations General Assembly Resolution 69/266 “A Global Geodetic Reference Frame for Sustainable Development” (2015). Available at <https://digitalibrary.un.org/record/796376> (accessed on 26 February 2026).

3. The timeline shown on this slide is adapted from: Federal Agency for Cartography and Geodesy (2023), “United Nations Global Geodetic Centre of Excellence. Sustaining the Global Geodetic Reference Frame”. Available at https://www.bkg.bund.de/SharedDocs/Pressemitteilungen/BKG/DE/PM/Download_Link/Flyer-Opening-GGCE.pdf?__blob=publicationFile&v=1 (accessed on 1 April 2025).



“The General Assembly,

- ...
- **Encourages** Member States and relevant international organizations **to enhance global cooperation in providing technical assistance** ... with the aim of ensuring the development, sustainability and advancement of the global geodetic reference frame;
- **Urges** Member States **to implement open sharing of geodetic data, standards and conventions**, on a voluntary basis, to contribute to the global reference frame and regional densifications ...
- **Invites** Member States **to commit to improving and maintaining appropriate national geodetic infrastructure** as an essential means to enhance the global geodetic reference frame;
- Also **invites** Member States **to engage in multilateral cooperation that addresses infrastructure gaps and duplications** towards the development of a more sustainable global geodetic reference frame;
- Further **invites** Member States **to develop outreach programmes** that make the global geodetic reference frame more visible and understandable to society.”

1. United Nations General Assembly Resolution 69/266 “A Global Geodetic Reference Frame for Sustainable Development” (2015). Available at <https://digitallibrary.un.org/record/790376> (accessed on 26 February 2026).

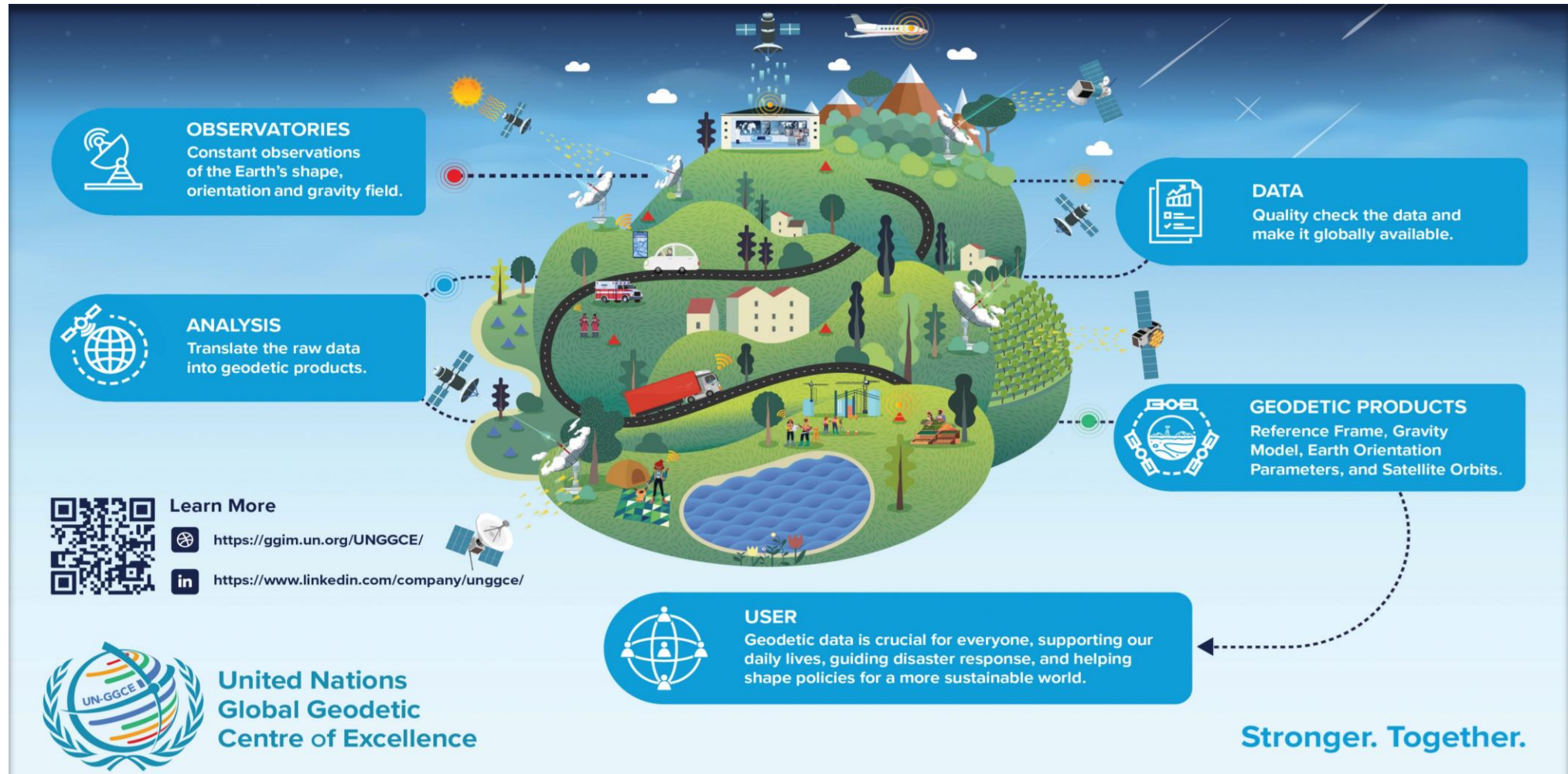
The Global Geodesy Supply Chain (GGSC) and its maturity assessment methodology



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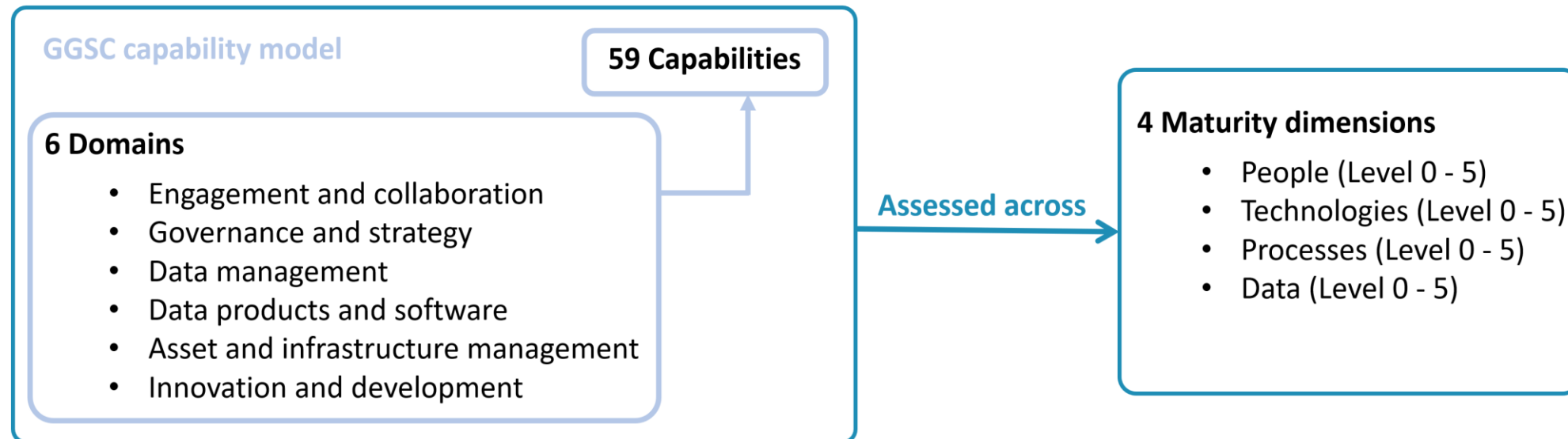
The Global Geodesy Supply Chain (GGSC)



Simplified schematic of the GGSC

GGSC maturity assessment framework

- **GGSC maturity** – a state when all necessary capabilities are fully developed to satisfy end-user needs.
- **GGSC capabilities** – set of core functions, processes, and competencies required for effective GGSC operation.



Schematic representation of the GGSC maturity assessment framework

1. In the context of this presentation, "entity" refers to an organisation, a company, or an enterprise.

For definitions of "maturity", "capabilities", and "maturity assessment model" refer to:

2. Stoiber, C., Stöter, M., Englbrecht, L. et al. Keeping Your Maturity Assessment Alive. *Bus Inf Syst Eng* 65, 703-721 (2023). <https://doi.org/10.1007/s12599-023-00805-y>

3. Mettler, T. (2011) 'Maturity assessment models: a design science research approach', *Int. J. Society Systems Science*, Vol. 3, Nos. 1/2, pp.81-98. Available at <https://www.inderscience.com/offers.php?id=38934>.

4. Jäkel J-I, Fischerkeller F, Oberhoff T, Klemm-Albert K (2024). Development of a Maturity Model for the Digital transformation of companies in the context of Construction Industry 4.0, *ITcon* Vol. 29, pg. 778-809, <https://doi.org/10.36680/j.itcon.2024.034>.

How was the GGSC maturity assessment framework developed?



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Frameworks used to develop the GGSC maturity assessment

Framework type	Framework / model name	Acronym	Concept and application area
Data management frameworks	Data Management Body of Knowledge	DMBOK	<ul style="list-style-type: none"> - Defines best practices for managing data across its lifecycle. - Positions data as a strategic asset within an organisation.
	Data Management Capability Assessment Model	DCAM	<ul style="list-style-type: none"> - Defines key data management capabilities and their maturity levels. - Used to assess organisational data management maturity.
	Data Management Maturity Model of the Capability Maturity Model Integration	CMMI-DMM	<ul style="list-style-type: none"> - Defines key data management practices and their maturity levels. - Used to assess the maturity of the implementation of data management practices.
Asset management frameworks	ISO standard for asset management	ISO 55001	<ul style="list-style-type: none"> - Specifies requirements for establishing, implementing, maintaining, and improving an asset management system. - Helps manage assets to deliver value.
Enterprise architecture frameworks	Open Group Architecture Framework	TOGAF	<ul style="list-style-type: none"> - Describes enterprise architecture across several layers, including business, data, application, and technology. - Used to design, plan, implement, and govern enterprise systems.
	Business Architecture Body of Knowledge	BIZBOK	<ul style="list-style-type: none"> - Defines principles and practices for managing business architecture. - Used to design and improve processes and capabilities of business models.
	International Development Organisational Business Architecture Reference Model	IDO	<ul style="list-style-type: none"> - Provides a structured approach (i.e., a model) to business architecture for international development organisations. - Used to standardise processes and capabilities across multiple organisations and stakeholders.

Frameworks used to develop the global geodesy supply chain maturity assessment

1. DMBOK <https://dama.org/learning-resources/dama-data-management-body-of-knowledge-dmbok/>
2. DCAM <https://edmcouncil.org/frameworks/dcam/>
3. CMMI-DMM <https://cmminstitute.com/cmmi>
4. ISO <https://www.iso.org/standard/83054.html>
5. TOGAF <https://www.opengroup.org/togaf>
6. BIZBOK <https://www.businessarchitectureguild.org/general/custom.asp?page=002>
7. IDO <https://learning.businessarchitectureguild.org/indref>, <https://www.prnewswire.com/news-releases/business-architecture-guild-releases-international-development-organization-reference-model-v1-0-302392594.html>

Components of the GGSC maturity assessment framework

Structural components of the GGSC maturity assessment framework		GGSC-specific	DMBOK	DCAM	CMMI-DMM	ISO 55001	TOGAF	BIZBOK	IDO
GGSC capability model			X	X	X		X	X	X
Capabilities	Engagement and collaboration	X					X	X	X
	Governance and strategy	X				X	X	X	X
	Data management	X	X	X	X		X		X
	Data products and software	X	X	X	X		X		X
	Asset and infrastructure management		X			X		X	X
	Innovation and development	X							X

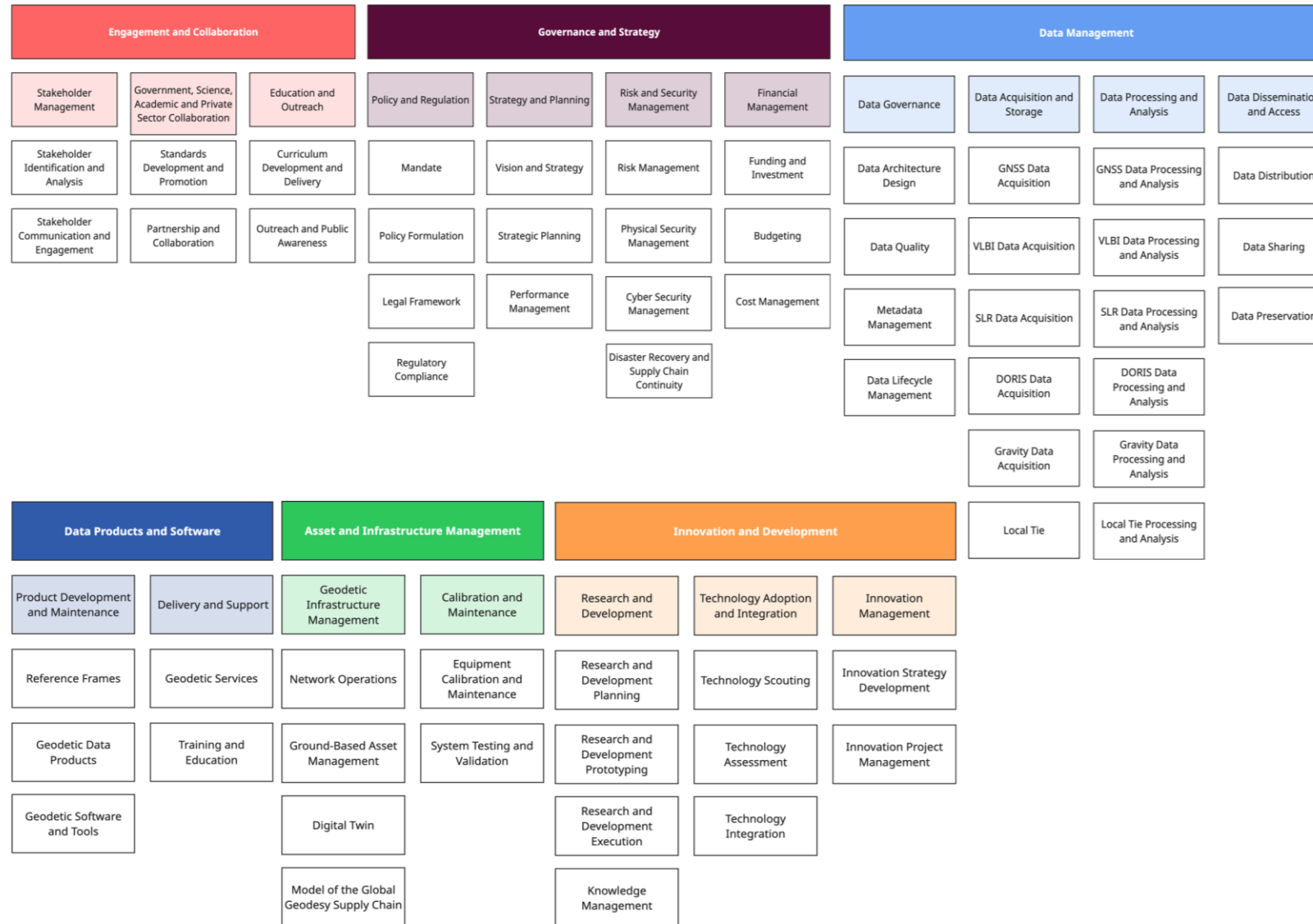
1. DMBOK, <https://dama.org/learning-resources/dama-data-management-body-of-knowledge-dmbok/>
2. DCAM, <https://edmcouncil.org/frameworks/dcam/>
3. CMMI, <https://cmmiinstitute.com/cmmi>
4. ISO 55001, <https://www.iso.org/standard/83054.html>
5. TOGAF, <https://www.opengroup.org/togaf>
6. BIZBOK, <https://www.businessarchitectureguild.org/general/custom.asp?page=002>
7. IDO, <https://learning.businessarchitectureguild.org/indref>, <https://www.prnewswire.com/news-releases/business-architecture-guild-releases-international-development-organization-reference-model-v1-0-302392594.html>

GGSC capability model

Domains

Subdomains

Capabilities



Components of the GGSC maturity assessment framework

Structural components of the GGSC maturity assessment framework		GGSC-specific	DMBOK	DCAM	CMMI-DMM	ISO 55001	TOGAF	BIZBOK	IDO
GGSC capability model			X	X	X		X	X	X
Capabilities	Engagement and collaboration	X					X	X	X
	Governance and strategy	X				X	X	X	X
	Data management	X	X	X	X		X		X
	Data products and software	X	X	X	X		X		X
	Asset and infrastructure management		X			X		X	X
	Innovation and development	X							X
Assessment measures									
Dimensions	People	X							
	Technologies						X		
	Processes		X		X		X		
	Data	X	X	X	X		X		
Maturity scale		X		X	X		X	X	X

Relationship between the components of the GGSC maturity assessment and other adopted frameworks

1. DMBOK, <https://dama.org/learning-resources/dama-data-management-body-of-knowledge-dmbok/>
2. DCAM, <https://edmcouncil.org/frameworks/dcam/>
3. CMMI, <https://cmmiinstitute.com/cmmi>
4. ISO 55001, <https://www.iso.org/standard/83054.html>
5. TOGAF, <https://www.opengroup.org/togaf>
6. BIZBOK, <https://www.businessarchitectureguild.org/general/custom.asp?page=002>
7. IDO, <https://learning.businessarchitectureguild.org/indref>, <https://www.prnewswire.com/news-releases/business-architecture-guild-releases-international-development-organization-reference-model-v1-0-302392594.html>

Assessment measures: dimensions

DIMENSIONS	DESCRIPTION
People	Human capital (e.g., skills, roles and responsibilities, experience, trainings, competency level, organisational culture) necessary for effective GGSC governance, strategy and operation.
Processes	Standardised practices and governance mechanisms that guide and control effective GGSC governance, strategy and operation.
Technologies	Digital and physical infrastructure that enable and support effective GGSC governance, strategy and operation.
Data	Assets that ensure effective GGSC governance, strategy and operation, including GGSC outcome – geodetic data products with properties that meet end-user needs.

Assessment measures: maturity scale for PEOPLE and PROCESSES

PEOPLE

Level	Meaning	Description
1	Undefined	Capacity funding is lacking or unknown, roles and responsibilities are undefined, skills are unassessed, and training is ad-hoc or absent.
2	Managed	Capacity funding is predominantly in-kind, roles and responsibilities are not well defined or reactive, skills of the people involved are assessed as inconsistent, and training is informal and unstructured.
3	Defined	Capacity funding limited and not long-term, inconsistent and / or partially in-kind, roles and responsibilities are partially defined for key functions, skills of the people involved are assessed as relevant, and training is available through formal channels for some needs.
4	Capable	Capacity funding is available for long-term contracts and a low dependence on in-kind support for critical functions, roles and responsibilities are well defined with clear accountability, skills of the people involved are assessed as strong and relevant, and training is available through formal channels and structured programs.
5	Empowered	Capacity funding is available for long-term contracts and there is no dependence on in-kind support for critical functions, roles and responsibilities are well defined with clear accountability and optimised to enhance collaboration, skills of the people involved are assessed as strong, relevant and continuously developed, and training is proactive through formal channels and structured programs.

PROCESSES

Level	Meaning	Description
1	Ad-hoc	Processes are not often formalised, documentation is limited or does not exist, communication of processes is inconsistent or absent, and the use of processes varies significantly between individuals or situations and not consistently followed.
2	Repeatable	Processes are typically informal and localized to a small number of applications, documentation may be available for some processes may be documented, but not in a standardized format or central repository, communication of processes is ad-hoc, usually verbal or within small groups and the use of processes are followed inconsistently, with a high dependency on individual or team knowledge.
3	Defined	Processes are often formal and regularly used, documentation is available in a standard format and stored centrally, communication of processes is formally communicated to relevant stakeholders, often through training or accessible repositories and the use of processes are expected but monitoring and enforcement are inconsistent.
4	Managed	Processes are formal and a standard part of the process lifecycle and is consistently applied, documentation is comprehensive including procedures, roles, and performance metrics, communication of processes is systematic and includes structured training and updates on process changes, and the use of processes are consistently followed, and adherence is monitored and measured quantitatively.
5	Optimised	Processes are streamlined and efficient, supporting rapid adaptation and improvement cycles, documentation is dynamic, continuously updated to reflect optimizations and integrates best practices, communication of processes is highly effective and proactive, ensuring all stakeholders are fully engaged in process performance and improvements, and the use of processes are consistently followed with a strong focus on optimizing execution, informed by continuous analysis of performance data and feedback.

Assessment measures: maturity scale for TECHNOLOGIES and DATA

TECHNOLOGIES

Level	Meaning	Description
1	Basic	Uncoordinated and incompatible, often not fit for purpose, poorly supported, difficult to scale, and only usable by experts.
2	Available	Ad-hoc network with minimal compatibility, is sometimes fit for purpose, has basic support and scalability, and is only usable by experts.
3	Standardised	A network with good compatibility and international discussions on enhancing compatibility, is fit for purpose most of the time, is mostly supported and scalable, and is only usable by experts.
4	Managed	A network with strong compatibility and investment based on operational user requirements, is well supported and scalable, and is usable by science users.
5	Strategic	A robust network with strong compatibility and investment based future needs, is proactively supported, optimised for scalability, and is usable for innovation.

DATA

Level	Meaning	Description
1	Siloed	Very little of the data is FAIR and the quality attributes of the data (e.g. timeliness, accuracy) are not well defined.
2	Aware	Little of the data is not FAIR and some of the quality attributes of the data (e.g. timeliness, accuracy) are not well defined.
3	Standardised	Some of the data is not FAIR and the quality attributes of the data (e.g. timeliness, accuracy) are mostly defined.
4	Governed	Most of the data is FAIR and the quality attributes of the data (e.g. timeliness, accuracy) are well defined.
5	Strategic	Most of the data is FAIR and the quality attributes of the data (e.g. timeliness, accuracy) are defined and monitored.

Current state of the GGSC maturity. Discussion of the results



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Current state of the GGSC maturity

DOMAIN	AVERAGE SCORE
Data Management	2.7
Data Products and Software	2.3
Asset and Infrastructure Management	2.3
Engagement and Collaboration	2.2
Innovation and Development	2.1
Governance and Strategy	1.8

Average maturity scores across the GGSC domains

Governance and strategy capabilities received the lowest score with

- **Mandate development (1.0)**
No international organisation has formal authority to develop, implement, or enforce policies for the GGSC
- **Strategic planning (1.0)**
Plans exist but lack governmental authority for implementation
- **Financial management (1.0)**
No coordinated mechanisms for assessing needs, developing investment strategies, or allocating resources across the GGSC
- **Risk management (1.0)**
No systematic risk assessment or mitigation at the GGSC level

Challenges in governing the GGSC

<p>International association of geodesy (IAG) provides effective scientific and technical coordination</p>	<p>BUT</p>	<p>IAG operates without governmental authority to direct Member State actions</p>
<p>UN General Assembly resolution 69/266 represents the strongest mandate for geodesy</p>		<p>UN General Assembly resolution 69/266 is non-binding and encourages voluntary action without formal implementation or accountability mechanisms</p>

GGSC maturity assessment limitations

- A different set of capabilities may yield different insights,
- The assessment represents the status as of May 2025 and is required to be performed on a regular basis,
- The scoring reflects expert views rather than a quantitative measure.

Summary and conclusions

- To advance the implementation of Resolution 69/266, we developed a methodology for assessing the GGSC maturity,
- The presented assessment represents the first-of-its-kind holistic evaluation of GGSC maturity,
- We identified 59 GGSC capabilities and assessed them across four dimensions (people, processes, technologies, and data),
- Governance and strategy capabilities are among the most vulnerable, receiving the lowest maturity scores,
- To uplift the progress towards the Resolution 69/266 implementation, the current GGSC governance mechanisms may need to be revised,
- GGSC maturity assessment aligns with the First Joint Development Plan for Global Geodesy¹ and emphasises the need for coordinated actions to strengthen the GGSC.

1. https://ggim.un.org/UNGGCE/documents/Version_1.0_1st_Joint_Development_Plan_for_Global_Geodesy_EN.pdf



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Thank you

