Dr Aletha de Witt

Director: Radio Astronomy Projects
Department of Science, Technology
and Innovation (DSTI)

What We Heard → What We'll Do

Making sure it's possible

science, technology & innovation
Department:
Science, Technology and Innovation
REPUBLIC OF SOUTH AFRICA

South African Geodesy Workshop

1-2 October 2025, SAAO, Cape Town

SAGWG
South African Geodesy Working Group

2030 NDP

What We Heard

- **The Geodesy Ecosystem**

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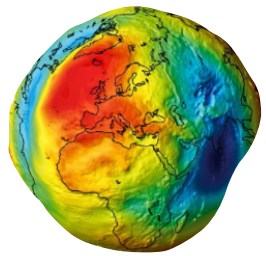
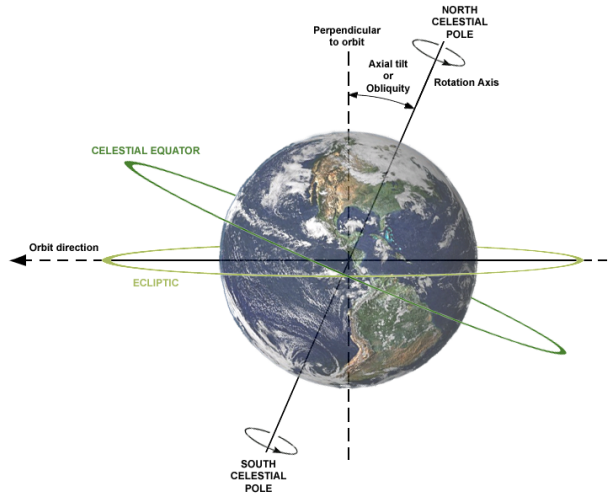
- **What is Geodesy and Why is It Important?**





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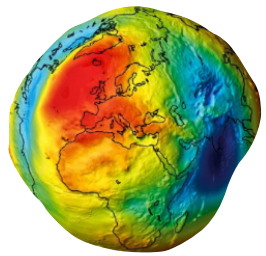

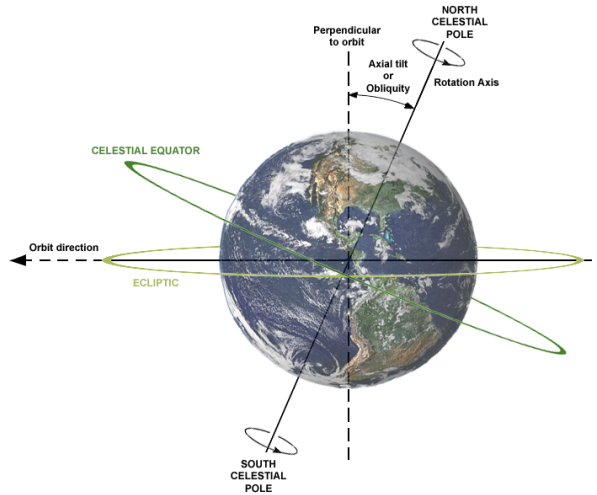

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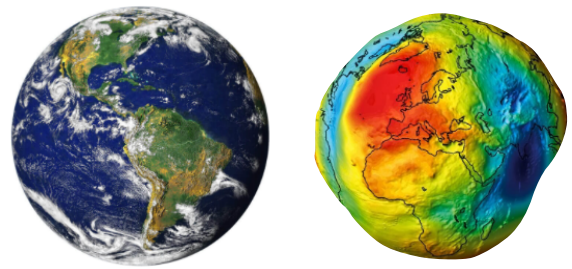

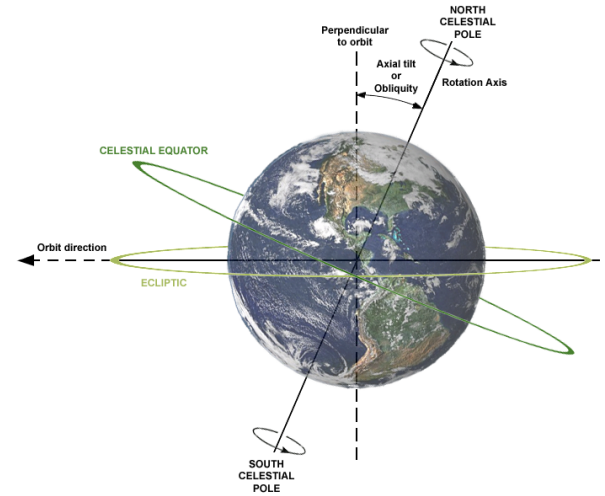

- **UN-GGCE: 1st Joint Development Plan (JDP)**

- **Towards a SAGWG and GGOS Africa:**
  Building local and regional capacity

SAGWG
South African Geodesy Working Group

What We Heard

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A National Strategy for Geodesy
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A National Strategy for Geodesy (DSTI & DLRRD)

- **Establishment and Structure of the SAGWG**

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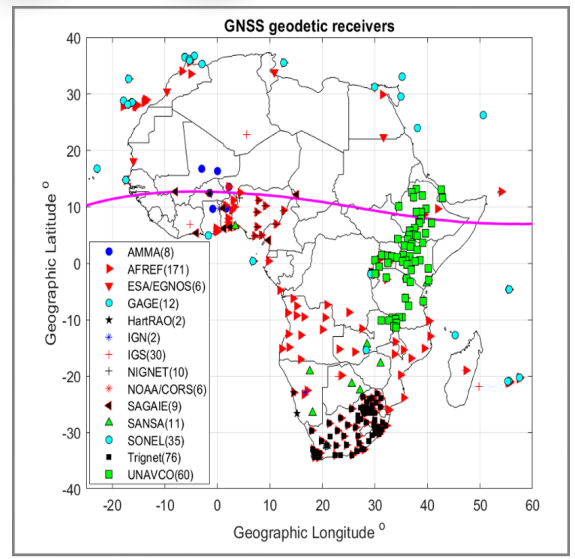
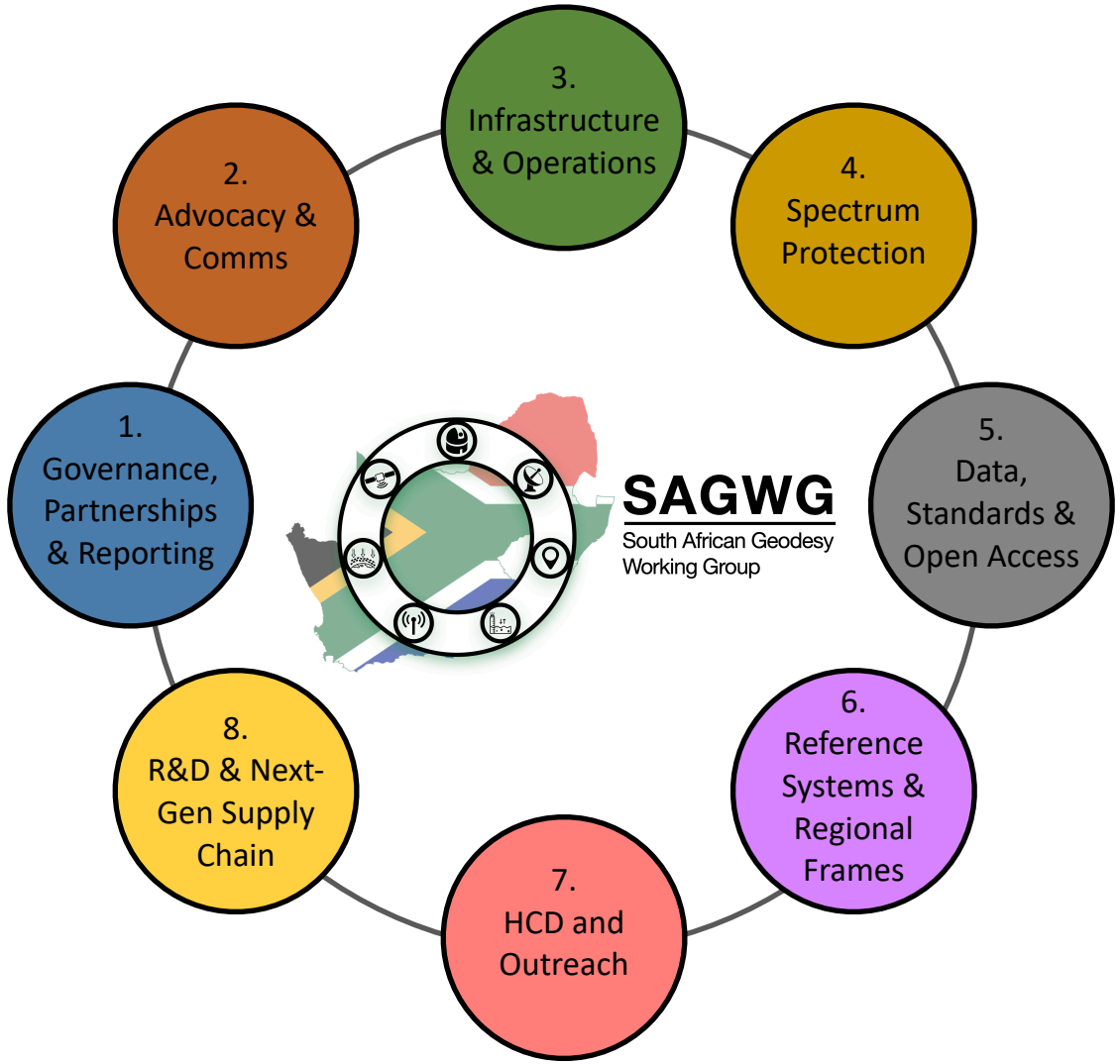
A National Strategy for Geodesy (DSTI & DLRRD)

- **Establishment and Structure of the SAGWG**



- **Laying the Foundations for GGOS Africa**

What We'll Do


3. Infrastructure & Operations
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5. Data, Standards & Open Access
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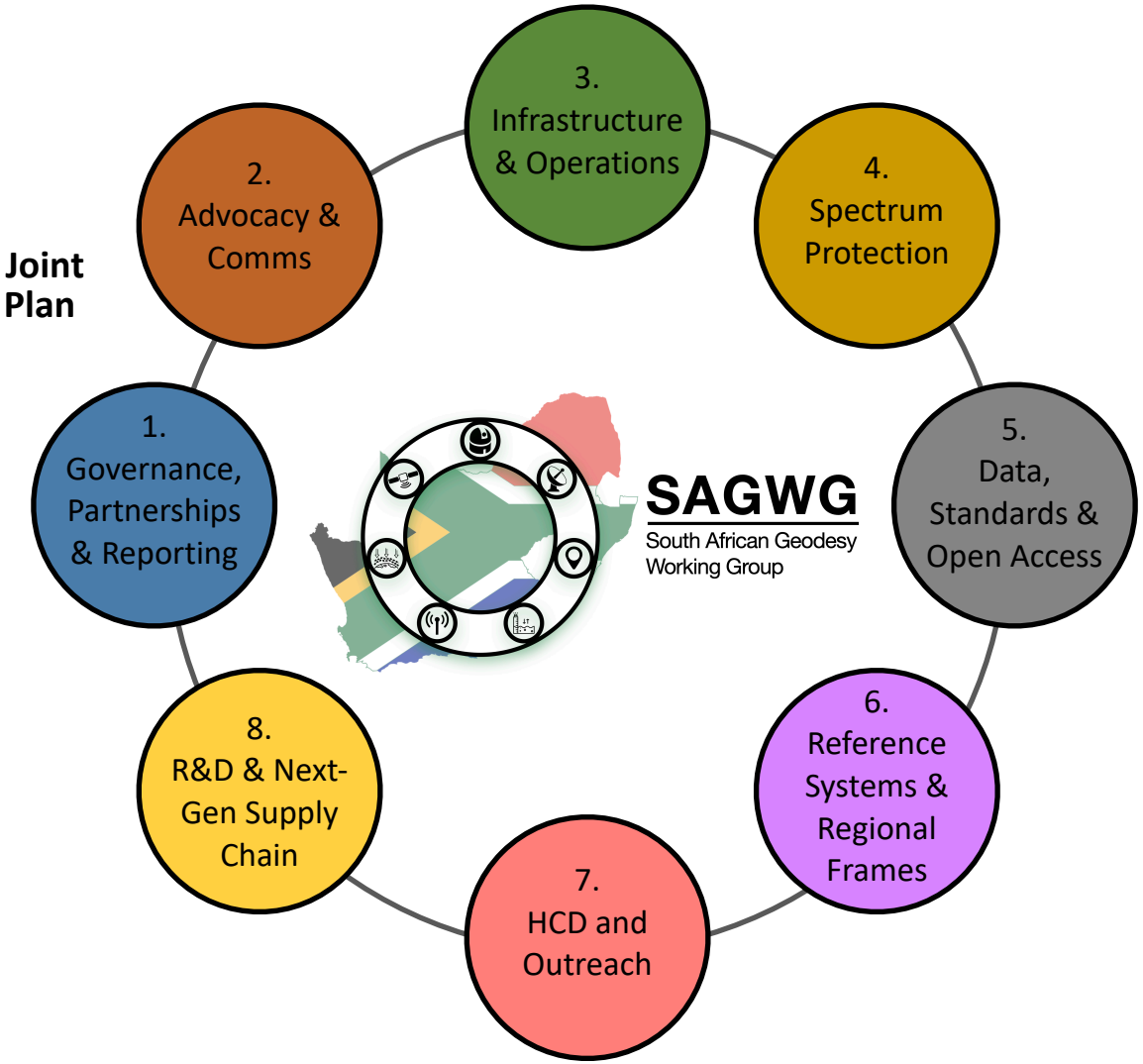
SAGWG
South African Geodesy Working Group

What We'll Do

UN-GGCE: 1st Joint Development Plan



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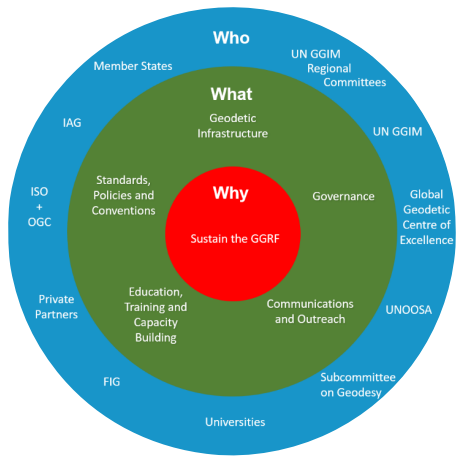

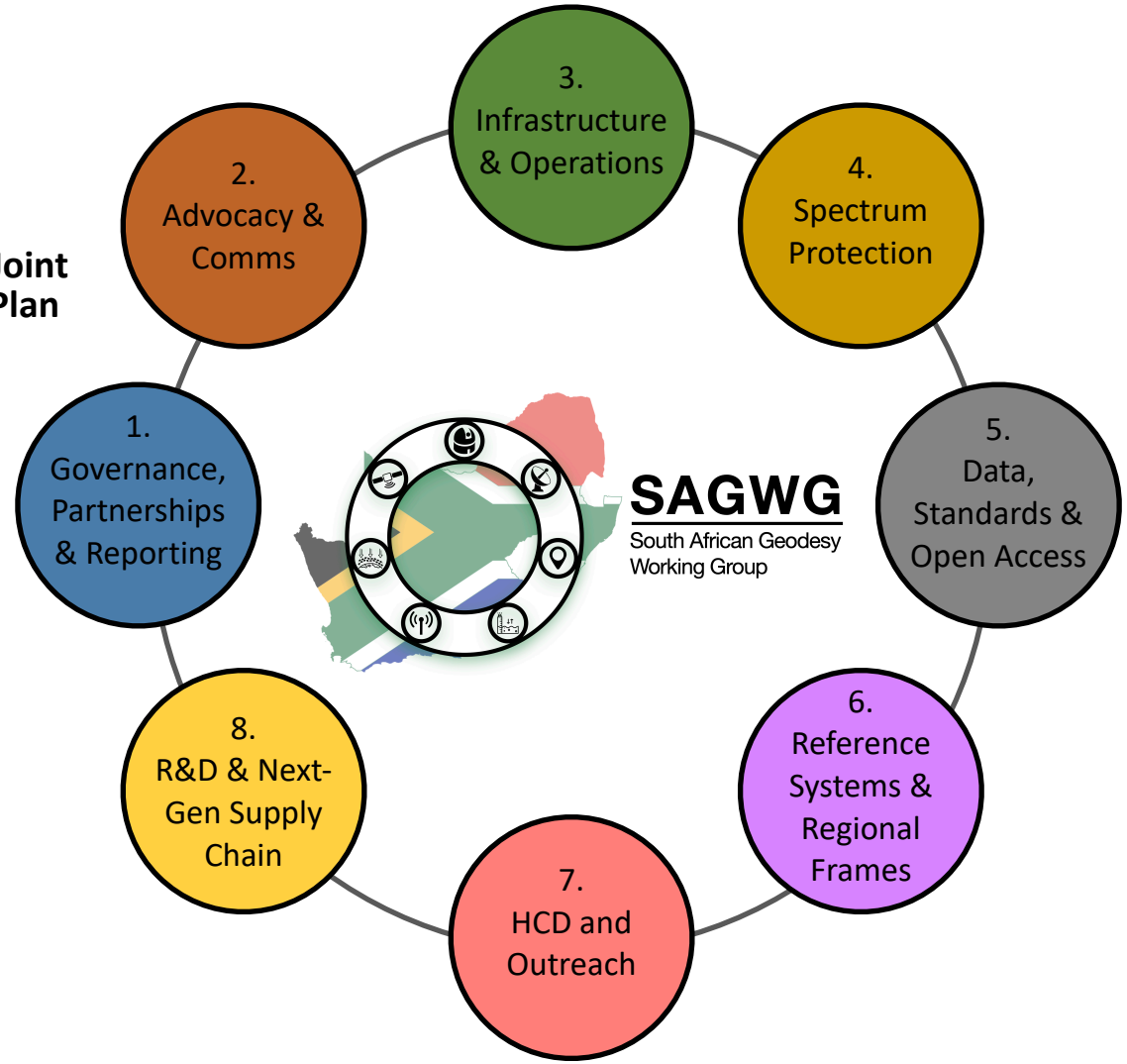

What We'll Do

UN-GGCE: 1st Joint Development Plan

1. Governance, Partnerships & Reporting
2. Advocacy & Comms
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South African Geodesy Working Group

A National Strategy for Geodesy
(DSTI & DLRRD)

What We'll Do

Establish strong national, regional, and global structures to coordinate, monitor, and represent geodesy

Development Plan Activities

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

- Establish, or strengthen an existing, country level geodesy working group
- Working group secretariat reporting via ASANA to UN-GGCE
- Lead development and implementation of a country level strategy and action plan
- Sign the UN-GGCE MMoU
- Attend UN-GGCE capacity development workshop and ongoing engagement
- Establish GGOS Africa and carry out capacity assessment
- Establish multi-domain partnerships and collaborations
- Represent SA on international bodies, e.g. IAG, GGOS, UN-GGIM

Phase 2: A robust global geodesy supply chain:

- Investigate options and identify ways to improve commitment and strengthen the governance mechanisms of the global geodesy supply chain
- Have bilaterial and multilateral discussions on options for stronger global geodesy supply chain governance framework
- Implement a standing item on UN-GGIM regional committee agendas on regional and global geodesy supply chain governance — GGOS Africa

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What We'll Do

Build the case for investment by showing geodesy's value to government, other science organizations, industry, and society

Development Plan Activities

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

- Develop and submit business cases to government to access resources
- Develop and communicate national and regional stories which demonstrate the value of geodesy to government, other science organizations, industry sectors and society

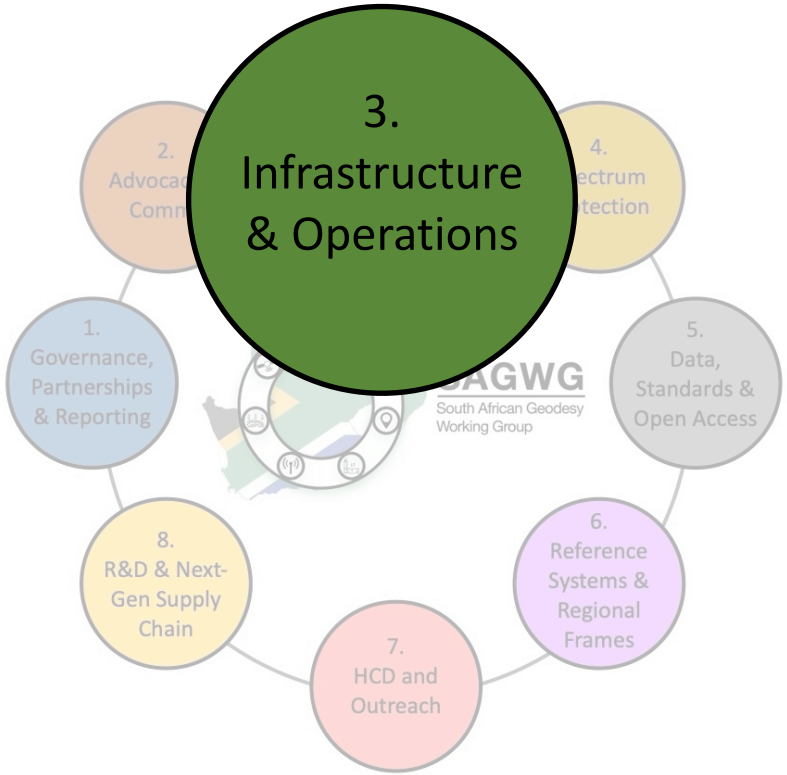
Phase 2: A robust global geodesy supply chain:

- Develop country-specific evidence (e.g., policy briefs, business cases, stories) to influence decision-makers and secure resources for a robust global geodesy supply chain, while designating and resourcing elements of that supply chain as critical national infrastructure where possible.
- Share evidence, and stories of success and failure (with respect to getting resources), with UN-GGCE to share with other Member States
- Increase awareness in the greater UN-community of the weaknesses of the supply chain and the need for improved governance

Phase 3: A next-generation global geodesy supply chain

- Same as Phase 2, but for a next-generation geodesy supply chain

What We'll Do



Determine national operational requirements and assess, maintain, modernise, and share geodetic infrastructure and resources to ensure reliable services

Development Plan Activities

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

- Assessment of geodetic infrastructure in SA and Africa
- Formalize long term agreements for the operation and maintenance of: existing ground observatory stations; and, data, analysis, combination, correlation and geodetic product development centres including consideration of land lease agreements, infrastructure maintenance, cybersecurity and staffing
- Where possible, provide redundant GNSS equipment to regional hubs for other Member States to use

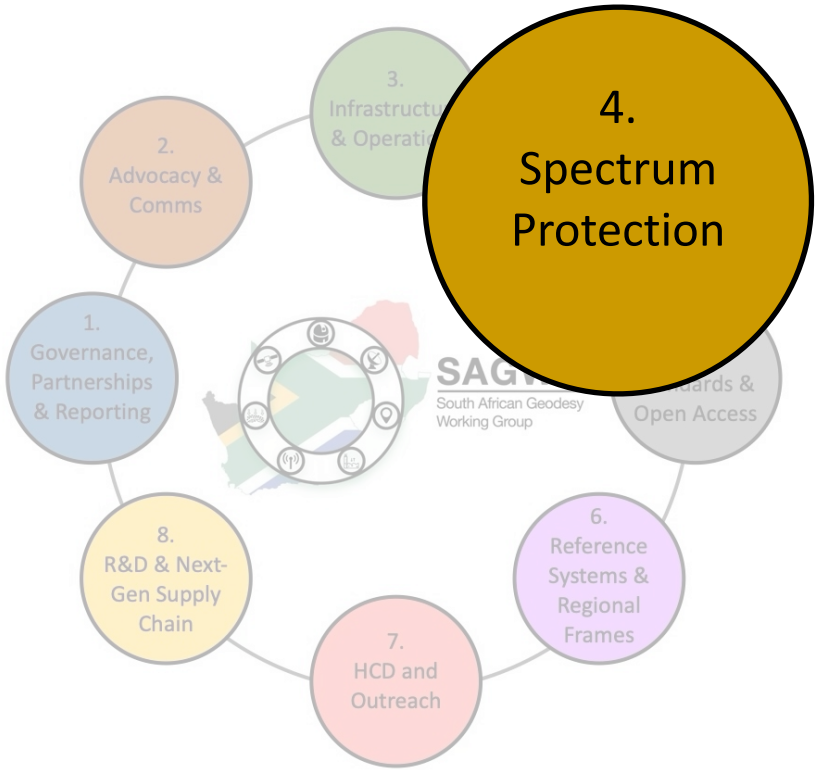
Phase 2: A robust global geodesy supply chain:

- Provide the UN-GGCE with your country's operational requirements from the global geodesy supply chain for critical national infrastructure and key resource sectors
- Financially contribute (e.g., by hosting infrastructure, providing data, or staff time) to the implementation and sustainment of a robust global geodesy supply chain

Phase 3: A next-generation global geodesy supply chain

- Same as Phase 2, but for next-generation requirements and a next-generation geodesy supply chain

What We'll Do



Safeguard geodesy's radio frequencies, core sites, and infrastructure to protect current and next-generation systems

Development Plan Activities

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

- Assess risks and take all practical steps to protect geodetic sites and infrastructure from harmful interference, light pollution, and other threats
- Actively engage regulators and authorities so they understand that geodesy needs spectrum protection and site protection, similar to astronomy — i.e. communicate the needs of the geodetic community to the Astronomy Management Authority (AMA, DSTI) and ICASA (DCDT)

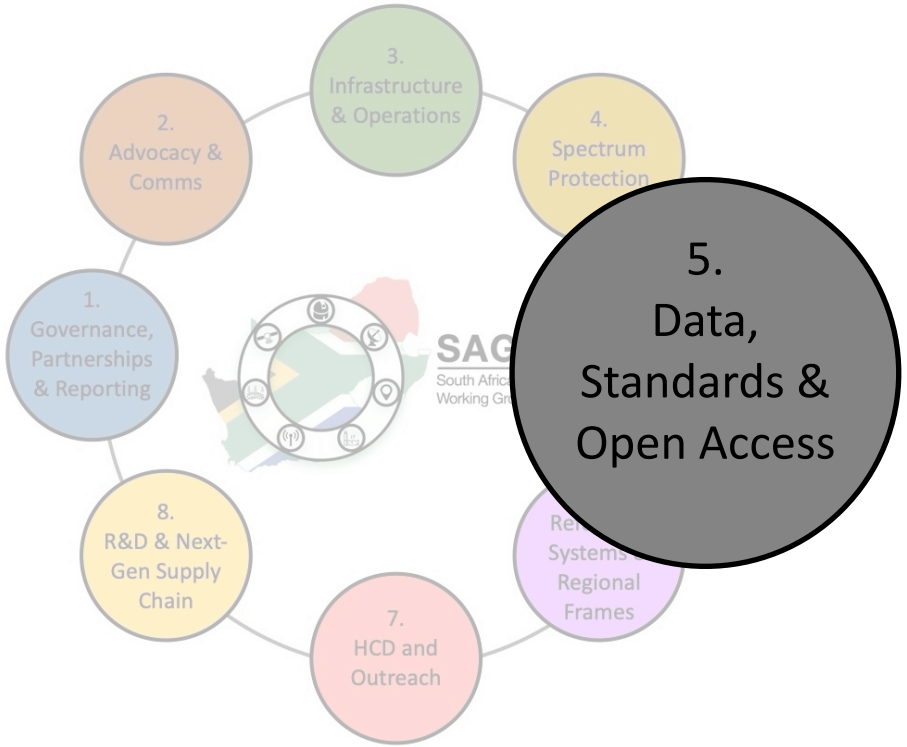
Phase 2: A robust global geodesy supply chain:

- Represent the needs of geodetic community at the International Telecommunications Union to protect the radio frequency spectrum required for geodesy (in collaboration with Astronomy community)

Phase 3: A next-generation global geodesy supply chain

- Go beyond safeguarding current geodetic VLBI frequency allocations to securing spectrum access for next-generation VLBI systems, including wideband VGOS, higher-frequency geodesy

What We'll Do



Ensure geodetic data are open, standardised, and interoperable, preserve legacy records, and adopt international and next-generation standards to guarantee long-term trust and accessibility

Development Plan Activities

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

- Where possible, make geodetic products available under Findable, Accessible Interoperable and Reusable (FAIR) principles
- Ensure records of legacy systems are preserved and integrated into modern frameworks to maintain continuity of reference frames and long-term data integrity

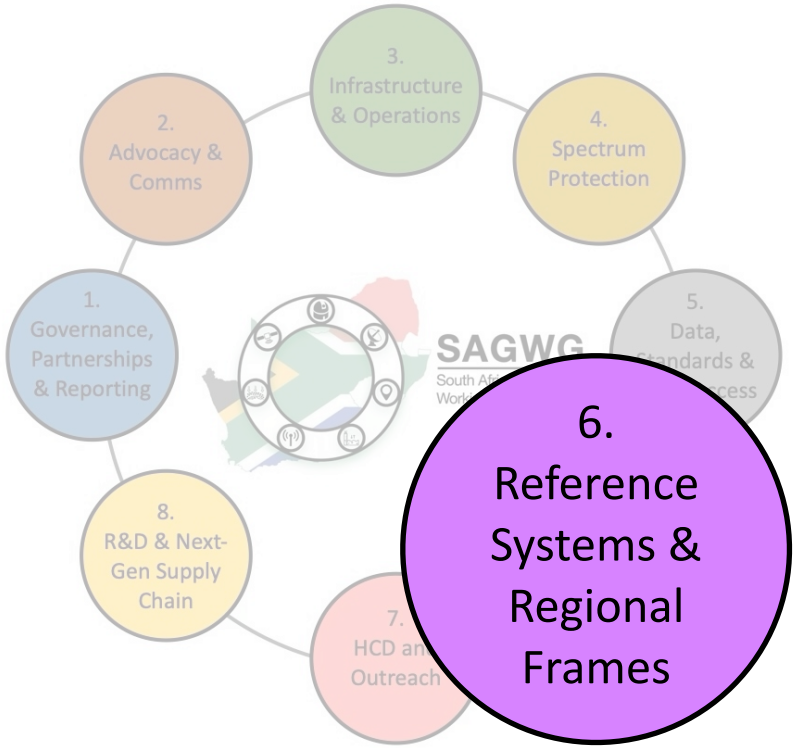
Phase 2: A robust global geodesy supply chain:

- Where possible, make geodetic data and products open and FAIR.
- Ensure metadata records comply with international standards.
- Document and share case studies of data sharing, the benefits that have arisen, and strategies for overcoming barriers
- Make Geospatial Reference System (GRS) information available in the International Organization for Standardization (ISO) Geodetic Register and EPSG register

Phase 3: A next-generation global geodesy supply chain

- Develop next-generation data standards (e.g. for quantum sensors, digital twins, AI integration) and establish sustainable stewardship frameworks to ensure long-term open access, interoperability — including new approaches such as VLBI observations of GNSS satellites — and trust

What We'll Do



Modernise national reference systems and sustain regional frames (e.g. AFREF) through coordinated governance and collaboration (e.g. SA Geodesy Working Group, GGOS Africa)

Development Plan Activities

Phase 2: A robust global geodesy supply chain:

- Review the current Geospatial Reference System (GRS) and determine if any elements need to be modernised to meet the needs of the country
- For Member States transitioning to a modern GRS, develop a country level roadmap and implementation plan describing how it will be realized (including resourcing, technical and stakeholder engagement requirements)
- 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
- Create and sustain regional working groups to govern the establishment and maintenance of regional reference frames — including coordination, advocacy, data processing and analysis, and the sharing and communication of geodetic data and results (e.g. AFREF under UN-GGIM: Africa, GGOS Africa)

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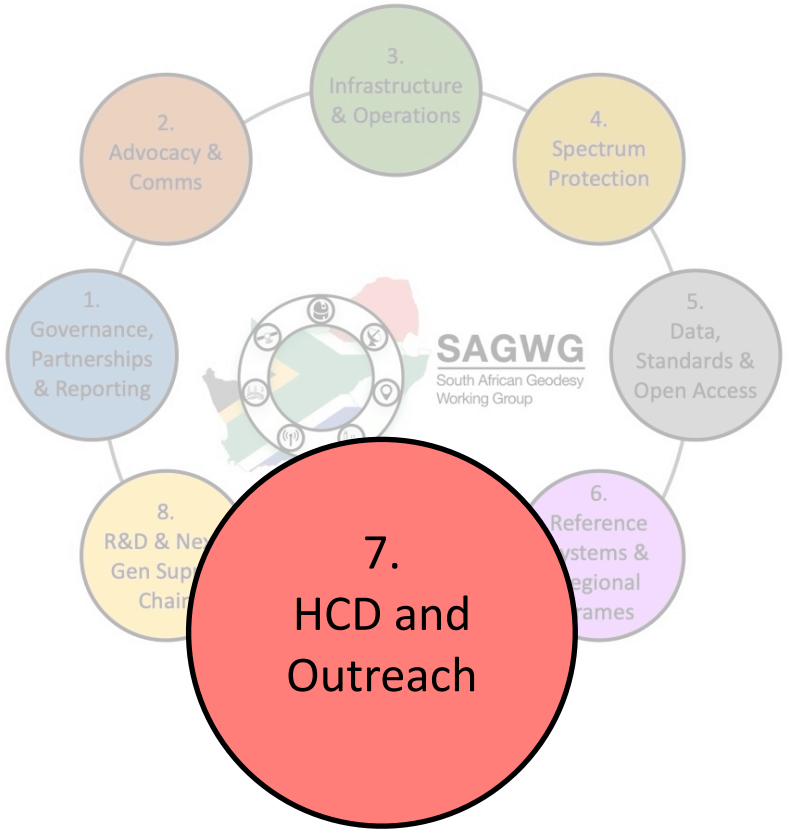

Assess national capacity, build and retain geodetic expertise through training, recruitment, and knowledge transfer, and strengthen partnerships with industry and astronomy, space science, and other sectors

Development Plan Activities

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

- Assess national needs and capacity gaps in geodesy to guide training, recruitment, and investment priorities
- Develop and retain a talented, diverse workforce in areas where skills are urgently needed
- Establish & strengthen formal geodesy training programmes, in partnerships with other sectors (astronomy space), international universities, industry
- Prioritise knowledge transfer by training new staff alongside experienced geodesists and ensuring continuity of expertise
- Increase recruitment of geodesists into science, defence, and government organisations to secure national capability
- Support geodesy research and development through scholarships, grants, and academic–industry collaboration

Phase 2: A robust global geodesy supply chain:

- Provide ongoing and sustainable financial support to the university sector for geodesy training and development programs

Phase 3: A next-generation global geodesy supply chain

In conjunction with the university sector, undertake the geodetic research and development required to sustain & enhance the global geodesy supply chain

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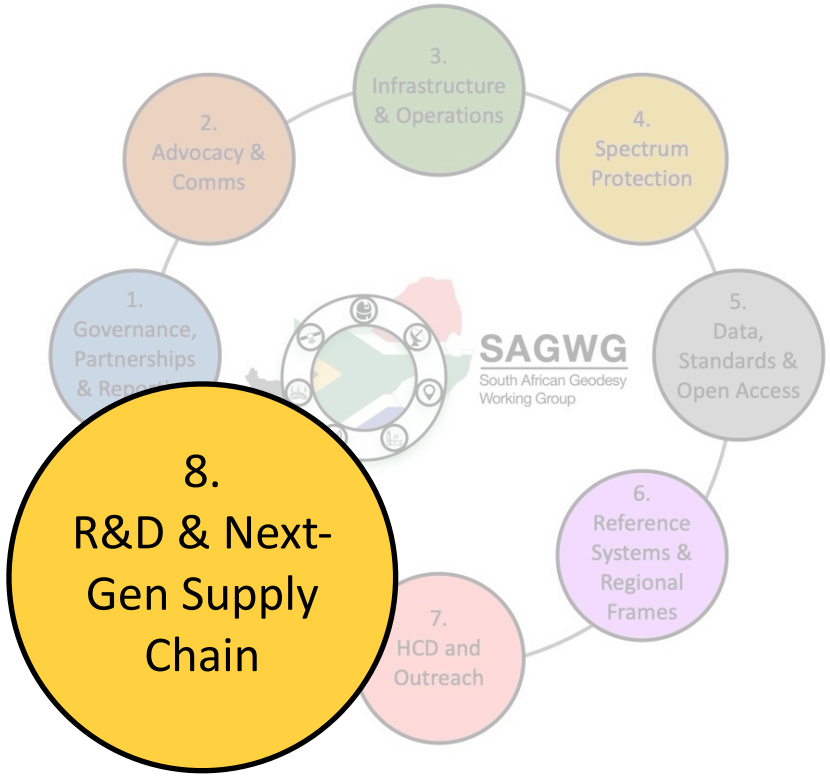

Support and advance geodetic research, development, and innovation, adopt emerging technologies, align with global initiatives, and build next-generation capacity for Africa's leadership in the geodesy supply chain

Development Plan Activities

Phase 3: A next-generation global geodesy supply chain

- Provide information to UN-GGCE regarding what are the operational requirements constituting a next-generation global geodesy supply chain
- Undertake the geodetic research and development required to sustain and enhance the global geodesy supply chain
- Where appropriate, support space missions relevant to geodesy such as the ESA Genesis mission or the NASA/ESA joint missions on satellite gravimetry
- Support projects where South Africa is already leading globally in developing new techniques and solutions
- Strengthen current SA-led geodetic R&D projects and encourage innovation, commercialisation, and multi-domain collaborations
- Adopt and implement emerging technologies — including machine learning and AI applications (e.g. in ionospheric modelling) — and ensure national infrastructure (e.g. VLBI receivers, HPC capacity) keeps pace with international developments
- Ensure geodesists have access to national HPC infrastructure for data-intensive research, modelling, and analysis
- Develop and support innovative infrastructure solutions for African capacity-building (e.g. remote stations, shared infrastructure models)

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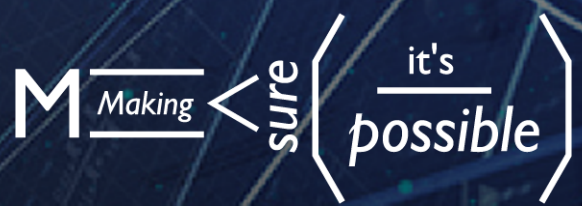
Dankie
Enkosi
Ha khensa
Re a leboga
Ro livhuwa
Siyabonga
Siyathokoza
Thank you



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