UNITED NATIONS GLOBAL GEODETIC CENTRE OF EXCELLENCE

MODERNISING GEOSPATIAL REFERENCE SYSTEM CAPACITY DEVELOPMENT WORKSHOP

Developing business cases for increased investment in geodesy

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GeoDEV international

Day 4, Session 2 [4_2_1]

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Session Overview

- Insights on how to develop a strong business case for securing investments
- Addressing Geodetic Needs
- Motivations for {Increased} Investment for Geodesy
- Options for Securing Investment
- Communicating these Needs and Motivations
- Case Studies
- Group Activity

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Motivations for Increased Investment – ‘Internal’

Software Upgrades

Enhance data processing and analysis capabilities.

Hardware Modernization

Improve accuracy and reliability of geodetic measurements.

Training and Resources

Build a skilled workforce to manage geodetic operations.

Maintenance & Support

Ensure continuous operation of geodetic infrastructure.

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Developing strong cases for securing funds – Why?

Developing a strong business case for securing geodetic investments is critical to..

- Stay operational
- Provide redundancy
- Support and maintain systems
- Extend capability (eg. densify/extend coverage)
- Upgrade systems (eg. more constellations)
- Train and sustain personnel and processes

=> Modernise the GRS

Crafting a Strong Business Case

Identify Critical Needs

Assess current gaps in geodetic infrastructure and capabilities

Highlight Motivations

Articulate compelling reasons for increased investment in geodesy

Explore Funding Options

Evaluate various sources and partnerships for securing investments

Showcase Revenue Potential

Demonstrate how additional services can generate income

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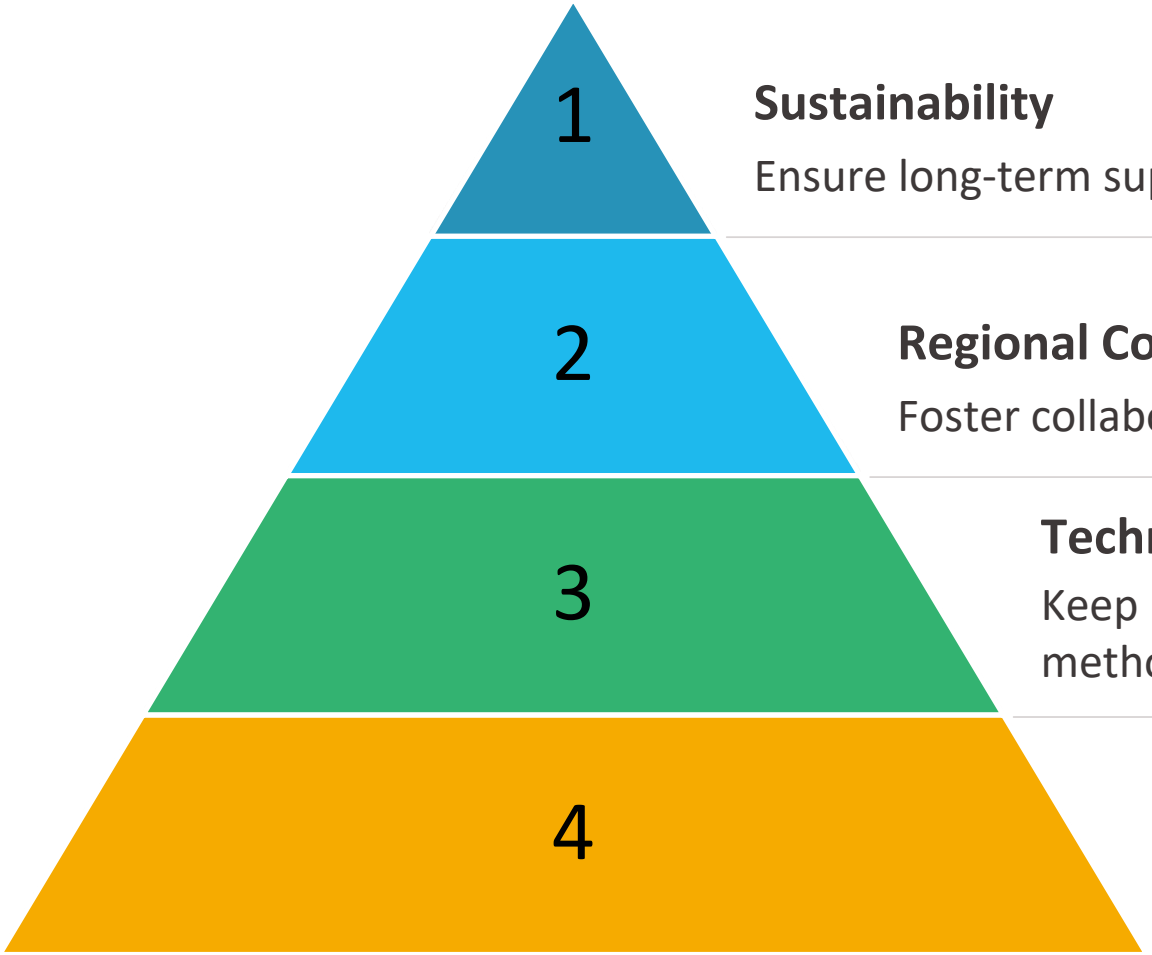
Addressing Geodetic Needs



Sustainability

Ensure long-term support for PNT and scientific applications

Regional Coordination

Foster collaboration across member states and regions

Technological Advancement

Keep pace with evolving geodetic technologies and methodologies

Capacity Building

Develop expertise and resources for comprehensive geodetic programs

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Landscape of National Motivators and Stakeholders

Map out the Motivators for your Country or Region, for example:

Top 3 Industries

1. Natural Resources
2. Agriculture
3. Shipping

Top 3 Govt Projects

1. Infrastructure
2. Water Supply
3. Cyber Security

Top 3 Growth Areas

1. Space Sector
2. Telecoms
3. Medical Research

Top 3 Challenges

1. Climate Change & Natural Disasters
2. Energy Costs
3. Border Security

Top 3 'Geodesy' Needs

1. Geoid Model Update
2. CORS Extension
3. Data Centre Upgrade

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Mini-Activity — Landscaping of National Stakeholders

Spend 5 minutes mapping the Landscape of your Nation…

Top 3 Industries

1.

2.

3.

Top 3 Govt Projects

1.

2.

3.

Top 3 Growth Areas

1.

2.

3.

Top 3 Challenges

1.

2.

3.

Top 3 'Geodesy' Needs

1.

2.

3.

**Use this landscape overview to help identify potential partners and stakeholders in your business cases*

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The Role of Geodesy…..

… for Infrastructure and Sustainable Development

Geodesy, the science of measuring and understanding the Earth's shape and gravity field, plays a crucial role in shaping our world.

From infrastructure development to sustainable urban planning and environmental monitoring, geodesy provides the foundational knowledge and tools for creating a better future.

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The Role of Geodesy…..

… for Infrastructure Planning and Design

Site Surveys

Geodetic surveys establish precise coordinates and elevations for infrastructure projects.

1

2

Alignment and Layout

Geodesy guides the alignment and layout of roads, railways, pipelines, and other infrastructure.

Construction Monitoring

Geodetic measurements monitor construction progress, ensuring adherence to design specifications.

3

4

Asset Management

Geodetic data helps manage and maintain infrastructure assets, optimizing resource allocation and ensuring safety.

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The Role of Geodesy.....

… for Maintenance and Monitoring of Infrastructure

Geodesy provides critical insights into the behavior of infrastructure over time, enabling proactive maintenance and ensuring long-term stability.

1

Structural Monitoring

Geodetic techniques assess structural stability, identifying potential deformation, subsidence, or movement.

2

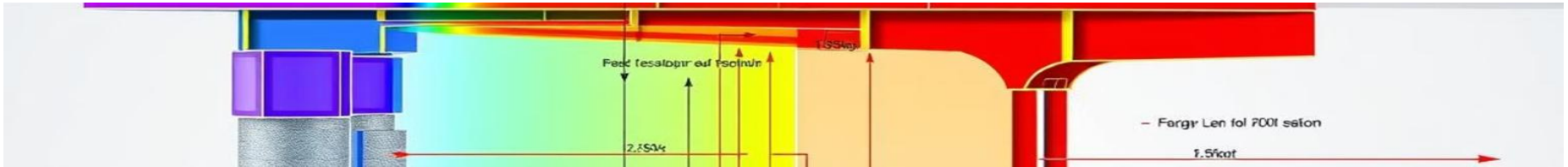
Bridge and Tunnel Monitoring

Geodesy helps monitor the performance of bridges and tunnels, ensuring safety and identifying potential risks.

3

Dam and Reservoir Monitoring

Geodetic measurements monitor dam and reservoir stability, ensuring safety and preventing potential failures.



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The Role of Geodesy.....

… for Sustainable Urban Development

Geodesy plays a vital role in promoting sustainable urban development by providing data for informed planning, resource management, and environmental protection.

Urban Planning

Geodetic data guides urban planning, ensuring efficient land use, infrastructure development, and public services.

Resource Management

Geodesy assists in managing water resources, mitigating flood risks, and optimizing water infrastructure.

Environmental Monitoring

Geodetic data monitors urban ecosystems, assessing land cover changes, pollution levels, and urban heat island effects.

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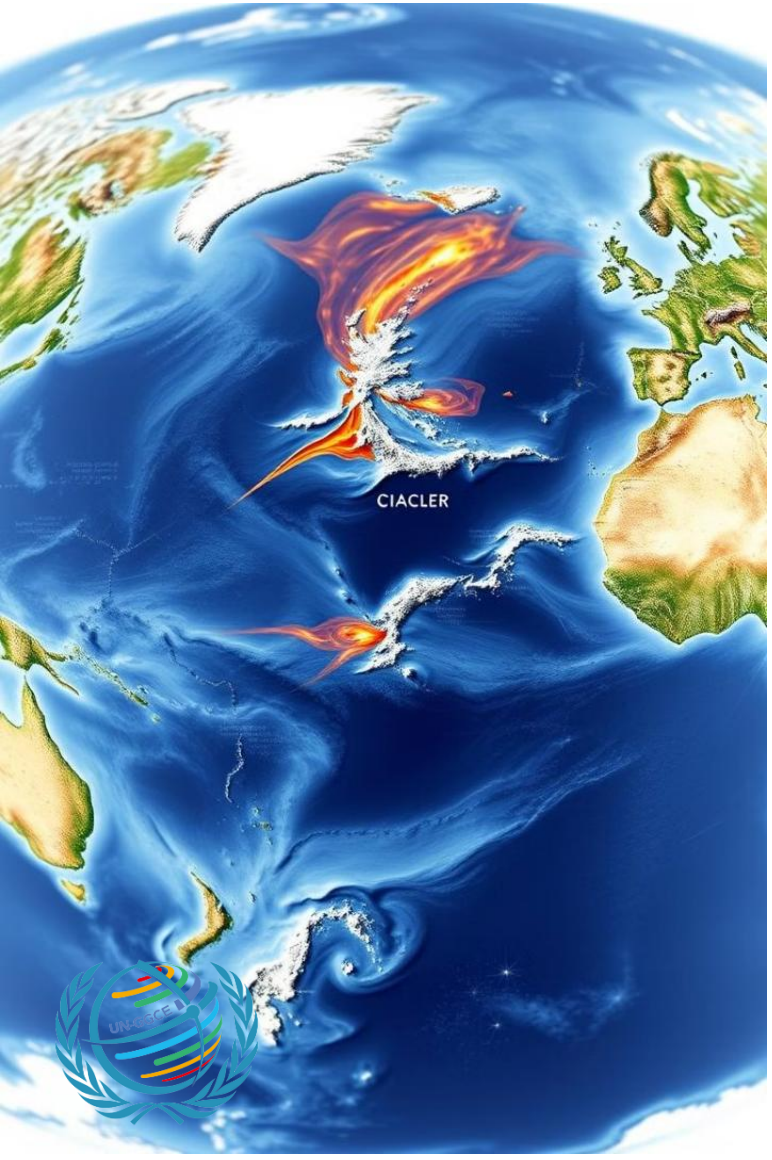
The Role of Geodesy…..

… for Sustainable Climate Change Monitoring



Geodesy provides essential tools for monitoring environmental changes, understanding their impacts, and guiding mitigation strategies.

Sea Level Rise

Satellite altimetry monitors changes in sea level, providing data for coastal management and adaptation.

Glacier Retreat

Geodetic measurements monitor glacier retreat, providing data for water resource management and climate change studies.

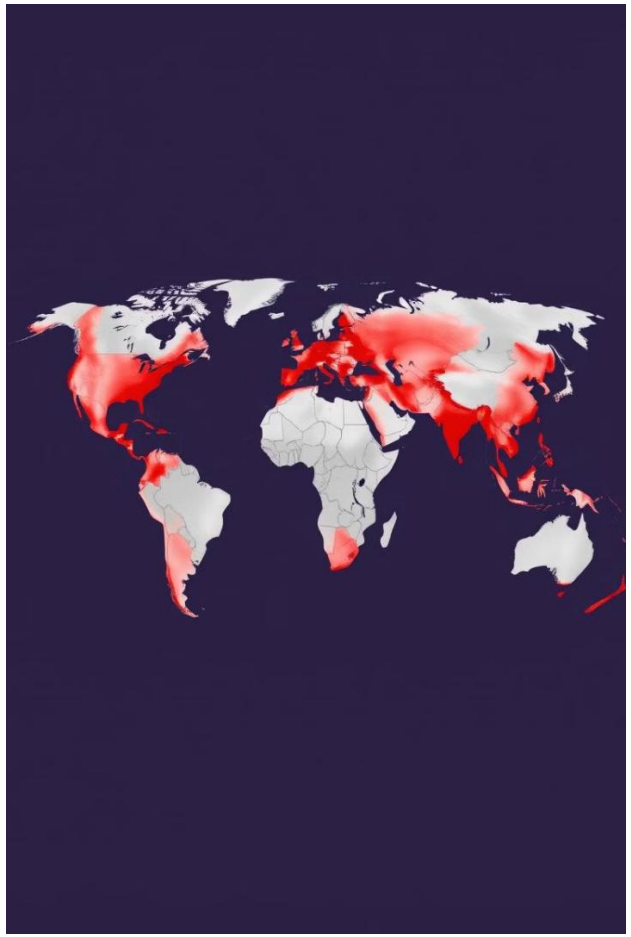
Deforestation

Geodesy helps monitor deforestation, providing data for conservation efforts and sustainable forest management.

Water Resource Management

Geodetic data assists in managing water resources, mitigating flood risks, and optimizing water infrastructure.

The Prevalence of Inaccurate / Outdated Geodetic Data



1 Outdated Surveys

Many geodetic surveys were conducted decades ago, using less precise methods and outdated equipment, leading to inaccurate data.

2 Changing Terrain

Natural processes like erosion, sedimentation, and tectonic plate movements can alter the Earth's surface, affecting the accuracy of geodetic data over time.

3 Data Discrepancies

Different data sources may use varying standards and reference systems, resulting in discrepancies and inconsistencies in geodetic data.

4 Limited Access

In some regions, access to reliable and up-to-date geodetic data is limited due to lack of resources or technological advancements.

Common Sources of Geodetic Data Inaccuracies

Measurement Errors

Human error, equipment limitations, and environmental factors can contribute to inaccuracies in geodetic measurements.

Data Processing Errors

Errors in data processing, such as incorrect coordinate transformations or faulty algorithms, can distort the accuracy of geodetic data.

Data Interpretation Errors

Misinterpretations of data or lack of understanding of geodetic concepts can lead to errors in analysis and decision-making.

Outdated References

Geodetic data is often referenced to outdated datums, which may no longer align with the current Earth's shape and size.

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The Impact on Various Industries and Applications

INDUSTRY	IMPACT
Construction	*Misaligned structures, compromised infrastructure, costly repairs*
Navigation	*Incorrect routes, accidents, delays*
Resource Management	*Inefficient resource allocation, environmental damage, economic losses*
Mapping	*Inaccurate maps, misleading information, poor decision-making*
Emergency Response	*Delayed response times, inaccurate location data, increased risk*

Safety Risks

Economic Losses

Environmental Impacts

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Why Invest in Geodesy? Key Benefits and Applications

Precision Agriculture

Optimizes crop yields and reduces resource waste

National Security

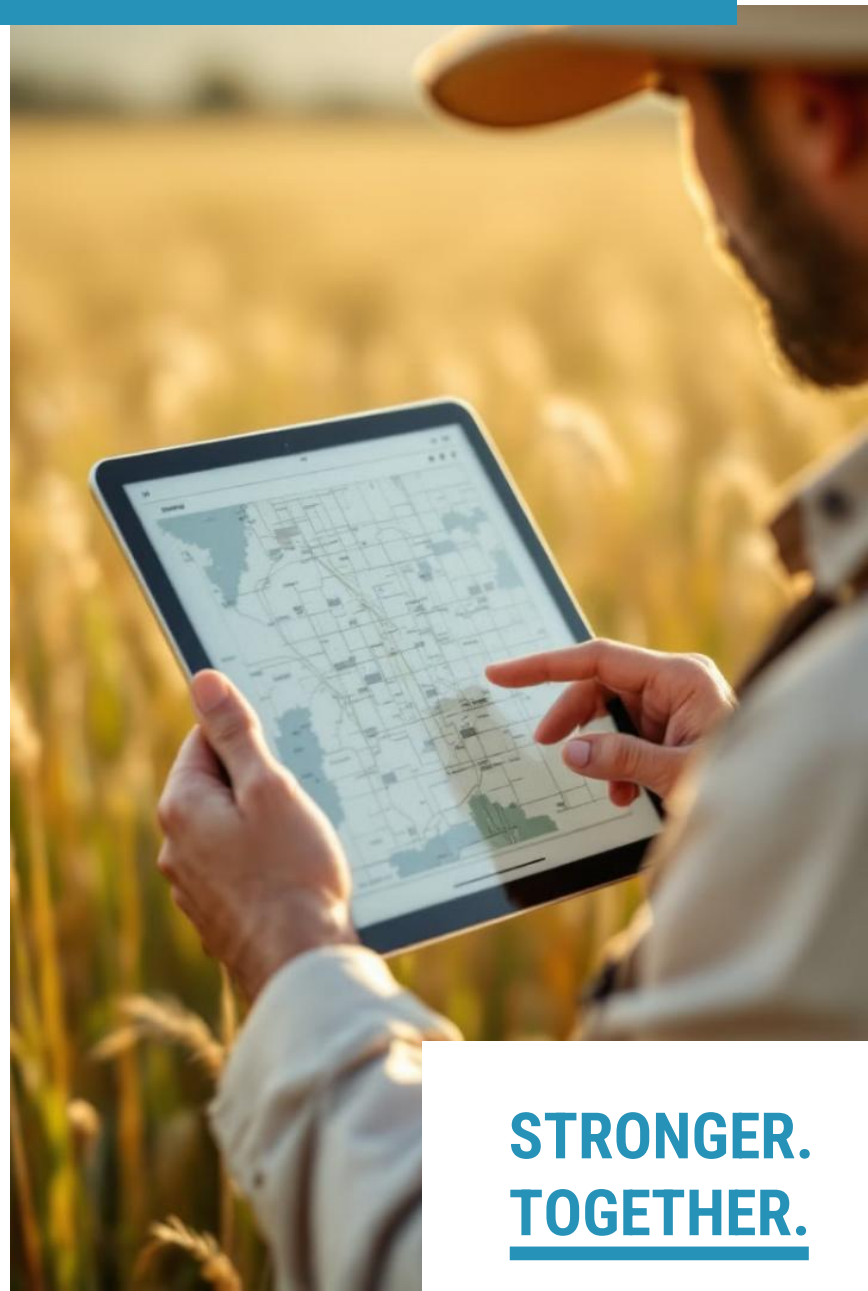
Enhances military operations and border surveillance

Economic Growth

Supports industries like shipping, aviation, and telecommunications

Environmental Protection

Aids in monitoring and managing natural resources



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Operating critical infrastructure

"15 of 18 critical infrastructure and key resources sectors relied on the Global Positioning System (GPS) including telecommunications, emergency services and financial exchanges."

~ U.S. Department of Homeland Security

Dana Goward, NSC director: GPS 'Still a Single Point of Failure', (*GPS World*, 4 Jan. 2022) https://www.gpsworld.com/nsc-director-gps-still-a-single-point-of-failure/ accessed 28 May 2024.

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Driving economic growth

"Over the next decade, revenue from GNSS, EO and satellite telecommunications – which cover over 80% of the space industry market revenue – is expected to grow at a mean annual growth rate of approximately 9%, reaching a total of almost €800 billion.

~ EUSPA Market Report and Euroconsult

EUSPA, Market Report 2022, https://www.euspa.europa.eu/sites/default/files/uploads/euspa_market_report_2022.pdf accessed 28 May 2024.

Euroconsult, 2022, Euroconsult estimates that the global space economy totaled $370 billion in 2021, https://www.euroconsult-ec.com/press-release/euroconsult-estimates-that-the-global-space-economy-totaled-370-billion-in-2021/ accessed 28 May 2024.

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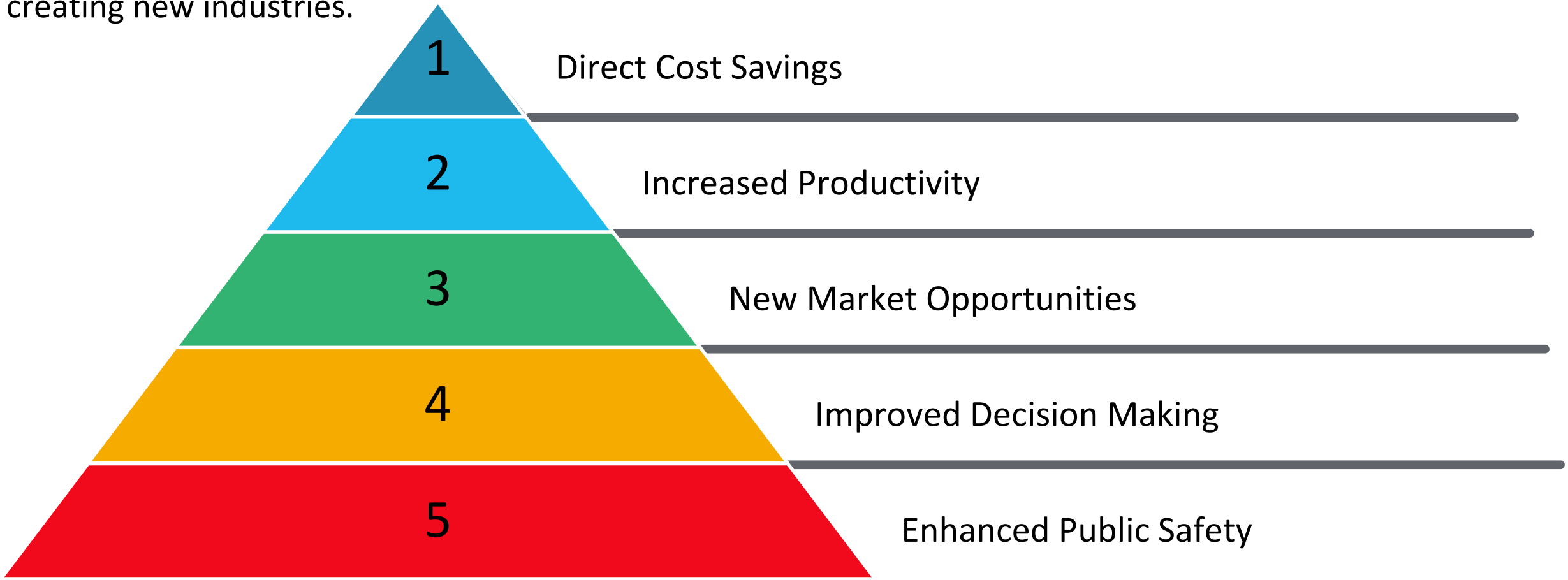
Measuring the Economic Impact of Geodetic Applications

Geodetic applications contribute to economic growth through multiple avenues, from direct savings to creating new industries.



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Increased Geodesy Investment – Challenges and Solutions

THEME	CHALLENGE	STRATEGY
LACK OF AWARENESS	Many decision-makers are unaware of geodesy's broad impact	Educate policymakers and industry leaders on geodesy's economic benefits
COMPETITION FOR FUNDING	Geodesy competes with other scientific fields for limited resources	Develop public-private partnerships to support geodetic infrastructure investments
LONG-TERM INVESTMENT	Benefits of geodetic investments often materialize over extended periods	Expertise - Invest in training programs to build a skilled geodetic workforce
TECHNICAL COMPLEXITY	The intricacies of geodesy can be challenging to communicate effectively	Promote standardization and interoperability of geodetic data and systems

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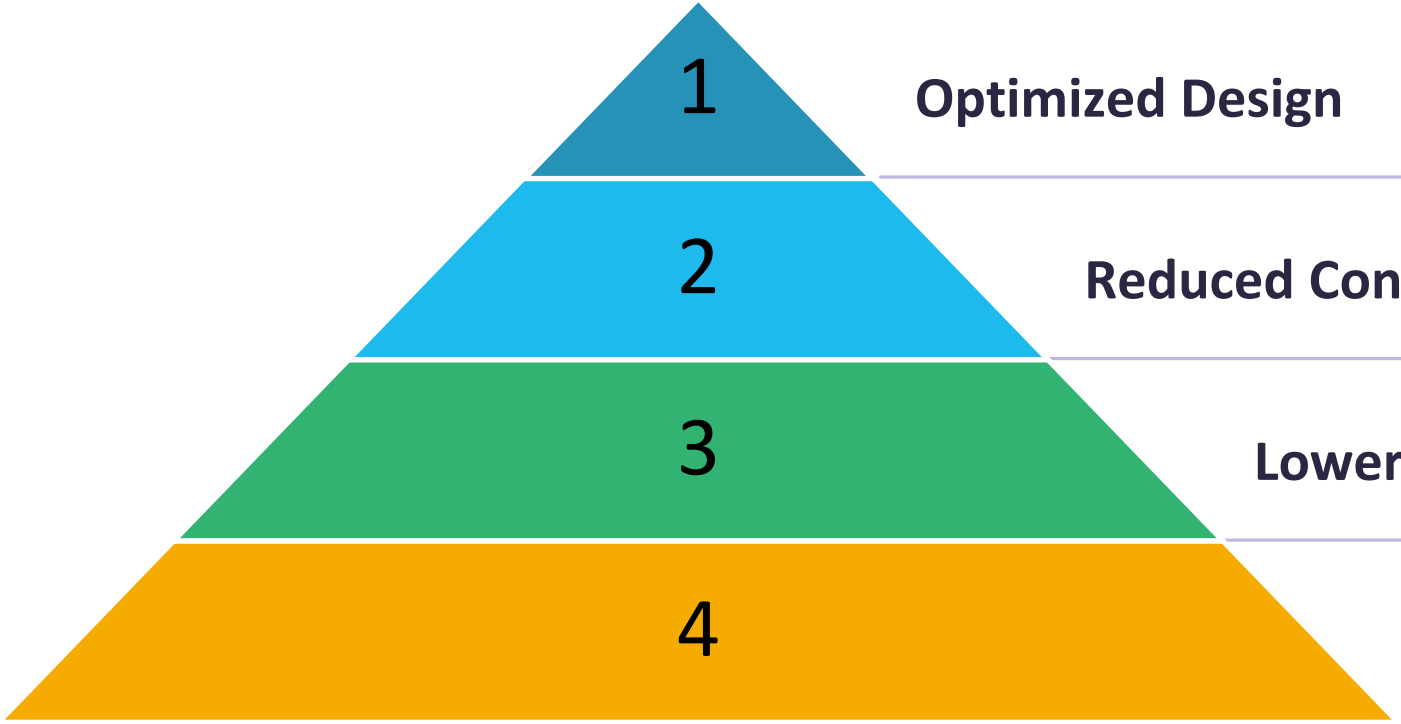
Cost Savings and Efficiency Gains from Geodetic Solutions

Geodesy plays a key role in optimizing designs, minimizing construction errors, reducing maintenance costs, and achieving better project outcomes, resulting in significant cost savings and efficiency gains.



Optimized Design

Reduced Construction Errors

Lower Maintenance Costs

Improved Project Outcomes

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Potential Funding Sources for Geodetic Projects

Government Agencies

Agencies like NASA, NOAA, and USGS often support geodetic projects through grants and contracts.

Foundations

Private foundations, such as the National Science Foundation (NSF) and the Gordon and Betty Moore Foundation, provide funding for scientific research, including geodesy.

Crowdfunding

Crowdfunding platforms like Kickstarter and Indiegogo allow researchers to raise funds directly from the public for specific geodetic projects.

Private Companies

Companies with a stake in geospatial data, like Google, Apple, and SpaceX, may invest in projects that advance their own interests.

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Grants from Government Agencies and Foundations

Government Agencies

Projects must align with agency priorities and funding opportunities.

Foundations

Foundation grants often focus on specific areas of research or geographic regions.

Strong Proposals

Grant proposals need to be well-written, compelling, and demonstrate the project's potential impact.

Budget Justification

Thorough budget justifications are essential to securing funding for necessary resources and personnel.

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Partnerships with Private Companies and Investors

1. Identify companies with geospatial data **needs** or interests in geodetic applications.
2. Develop a mutually beneficial partnership that leverages company resources and expertise.
3. Ensure a clear understanding of expectations, roles, and responsibilities for all parties involved.
4. Document the partnership agreement, including intellectual property rights, data ownership, and profit sharing arrangements.

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Leveraging Existing Infrastructure and Expertise

1

Collaboration

Connect with universities, research institutions, and government agencies that have existing geodetic expertise and infrastructure.

2

Data Sharing

Explore opportunities for data sharing and joint research projects, leveraging existing datasets and resources.

3

Joint Projects

Collaborate on research projects that combine complementary strengths and address shared research goals.

4

Capacity Building

Support the development of new geodetic expertise and infrastructure through training programs and educational initiatives.

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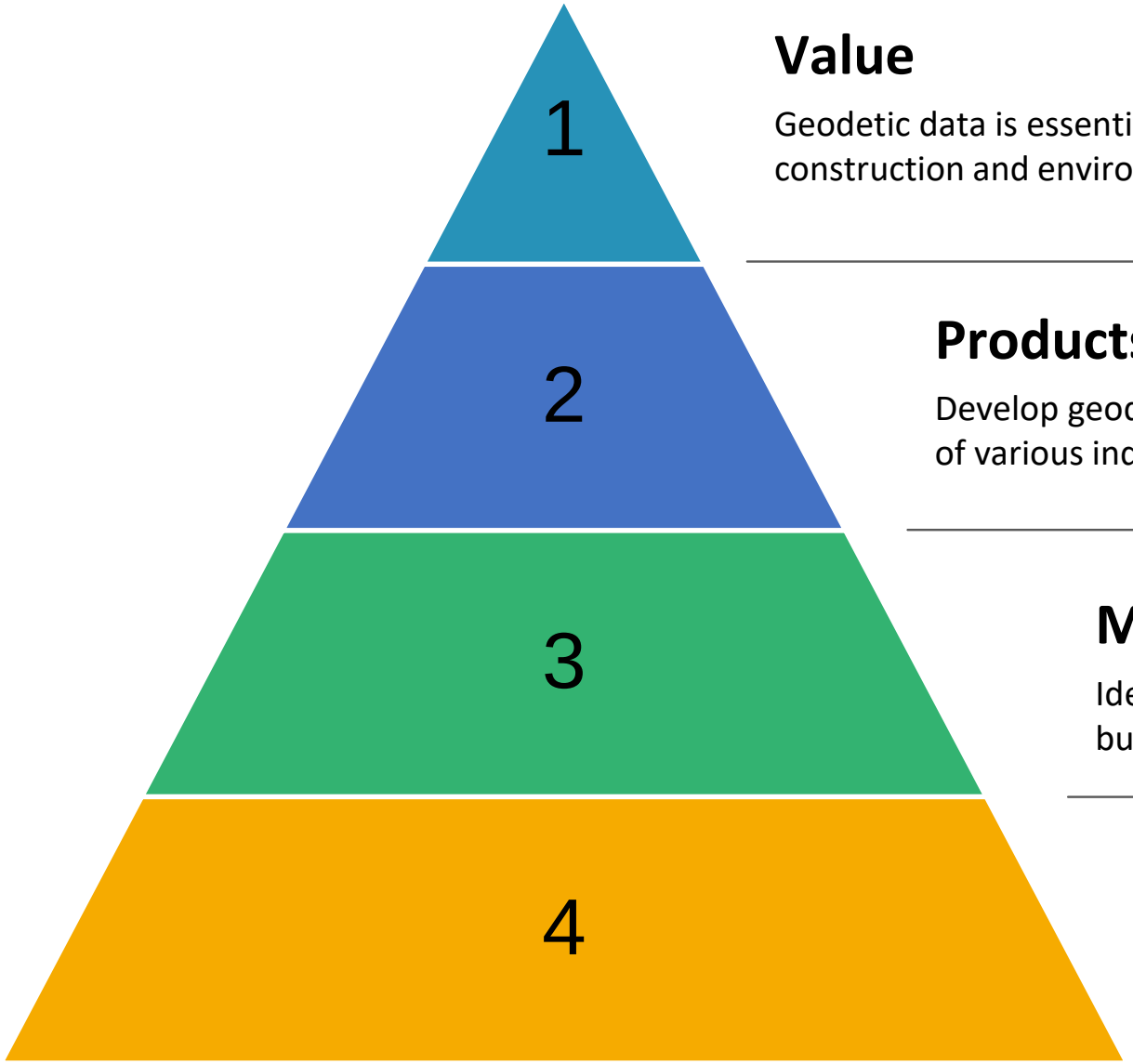
The 2030 AGENDA

17 Goals
169 Targets and
230 Indicators

FIG

Opportunities for Commercialisation of Geodetic Data



Value

Geodetic data is essential for a wide range of industries, from agriculture and transportation to construction and environmental monitoring

Products

Develop geodetic data products and services that meet the specific needs of various industries and sectors

Markets

Identify target markets for geodetic data products and services, such as businesses, government agencies, and research institutions

Business Model

Develop a sustainable business model for commercializing geodetic data products and services, ensuring profitability and long-term success

Options for securing Investment – Services

Examples: How additional Services can generate revenue e.g.

- **CORS RTK Services** (by Institutional or Industry providers, or partnerships)
- **GNSS Data Post-processing services** (in addition or instead of RTK)
- **Data/information sharing** with scientific community (i.e. RINEX data, Meteorological applications)
- **Licensing of additional Services through Outsourcing**

Focus on Revenue-generating opportunities which can support:

- a primary need (i.e. geodetic infrastructure) AND
- enable secondary services to one or more industry sectors (eg precision agriculture, construction) are becoming commonplace

Facilitating Benefits for multiple Stakeholders is Key

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Landscape of National Motivators and Collaborators

It is very useful to consider the Motivators for your Country/Region,

Top 3 Industries

1. Natural Resources
2. Agriculture
3. Shipping

Top 3 Govt Projects

1. Infrastructure
2. Water Supply
3. Cyber Security

Top 3 Growth Areas

1. Space Sector
2. Telecoms
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Top 3 'Geodesy' Needs

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*Use this landscape overview to help identify potential partners / stakeholders in your business cases

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Group Activity – Drafting Business Cases

Purpose: Create feasible candidates for viable geodesy-themed business cases based on your National Landscape for Motivators & Stakeholders

Working in Buddy-pairs:

1. Identify 3 situations where Geodesy investment is required in your country (e.g. Modernisation, Upgrade, extensions, etc)
2. For each situation, discuss where new opportunities could happen thanks to this investment (e.g. could it improve the output or efficiency of an industry, help improve quality of life, help achieve a UN-SDG (Sustainable Development Goal), where could it fit on the Landscape of National Motivators?
3. What can the participants do with these ideas??

We appreciate that you are Engineers & Scientists, NOT procurement or policy writers…. ☺

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Group Activity – Business Cases Ideas

TASKS	Situation #1	Situation #2	Situation #3
Identify 3 situations of Geodesy in your country, requiring financial investment…. (and how much)?			
What new benefits would appear when this situation is resolved? What Motivator(s) does it align with?			
What can you do to help secure this funding?			

Group Activity – Feedback

A number of buddy-pairs will be invited to present one scenario to the entire group.

1. Identify 1 situation of Geodesy in your country, requiring financial investment…. (and how much)?

2. What will new opportunities could appear if this situation received financial investment? Which top motivators does it match with?

3. What can you do to help secure this funding?

Summary

Session on developing business cases for investment in geodesy covering investment strategies and approaches

Developing and aligning investment business cases with partners / stakeholders is recommended

Having a primary goal and multiple additional goals is seen as beneficial to funding providers (=> Two for the price of one!, Buy One, Get One Free)

Discussions and Group activity gave many examples where Additional investment is:

- Required to sustain geodesy in your member states
- Provide benefit and value to multiple parts of society, industry and government

How could GGCE assist you in crafting strong business cases???

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