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Module 1 Policy Analysis & Strategic Construction



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Policy Analysis and Strategic Construction

Leveraging UNIGIF to Navigate Geospatial Industry Transformation

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This course we will be discussing on how policymakers can:

- ✓ Leverage geospatial industrial innovations to accelerate national geospatial capabilities
- ✓ Position their countries competitively in the global geospatial economy
- ✓ Use UNIGIF's 9 strategic pathways to capture value from industry transformation
- ✓ Develop sustainable, world-class geospatial information ecosystems







Introduction



The Challenge

The geospatial industry is transforming at unprecedented speed. Traditional approaches are becoming obsolete. Technology cycles are accelerating beyond government planning rhythms.



Technological Convergence

- ✓ Integration of AI/ML with geospatial analytics is enabling predictive modeling and automated feature extraction
- Cloud computing and edge processing are democratizing access to high-performance geospatial computing
- ✓ Fusion of satellite imagery, IoT sensors, and real-time data streams creates comprehensive digital twins
- ✓ Small satellite constellations and commercial space launches are reducing costs and increasing temporal resolution

Market Expansion

- Geospatial technology market projected to grow significantly, expanding beyond traditional GIS users
- New applications in autonomous vehicles, precision agriculture, climate monitoring, and urban planning
- Shift from specialized users to mainstream business intelligence tools



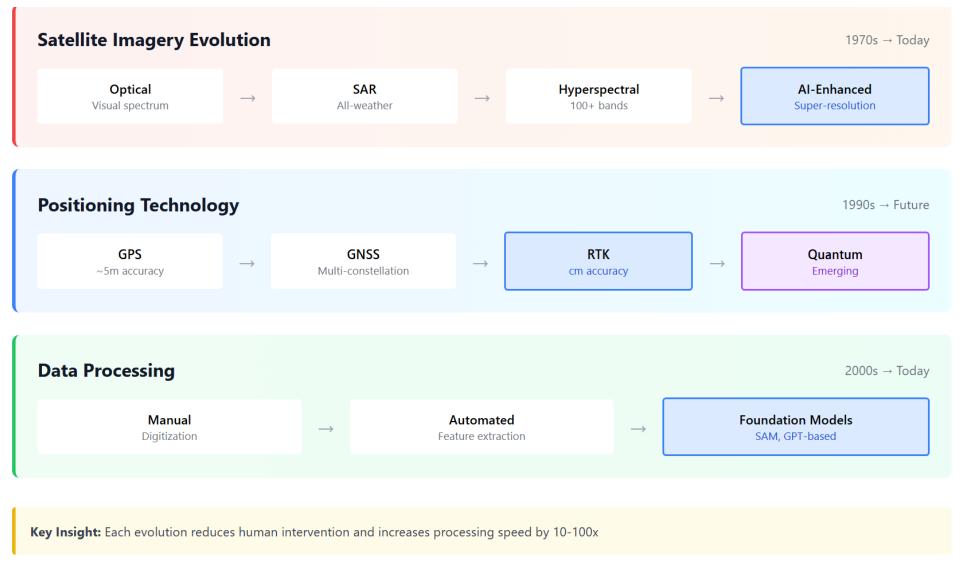






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Core Technology Evolution Map









AI/ML Integration Across the Value Chain

AI Applications: • Intelligent tasking (predict high-value targets) **Data Acquisition** • Cloud filtering and image selection • On-orbit processing decisions **Al Applications:** Automated orthorectification **Processing** • Super-resolution enhancement • Multi-source data fusion **Al Applications:** • Object detection and classification **Analysis** • Change detection algorithms • Predictive modeling and forecasting **Al Applications:** • Natural language query interfaces **Delivery** • Automated report generation • Personalized insights and alerts **Disruption Impact Value Migration**

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From data collection to interpretation and decision support





Manual analysis jobs displaced; new roles in model training emerge

Key Technological Breakpoints

Foundation Models



SAM (Segment Anything Model) for geospatial data

Impact:

- Automated feature extraction from imagery
- Reduces analyst time by 80%
- Enables real-time change detection

Real-Time Processing



Edge computing meets satellite data

Impact:

- On-satellite processing capabilities
- Minutes vs. hours for results
- Enables time-critical applications

Edge Computing



Distributed spatial analysis at scale

Impact:

- Process data closer to collection point
- Reduces bandwidth costs by 90%
- Powers IoT spatial applications

Digital Twins



Virtual replicas of physical assets

Impact:

- Real-time monitoring and simulation
- Predictive maintenance capabilities
- Integration of IoT + GIS + BIM

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Understanding the Transformation

4

Technology

- Commercial space revolution
- AI/ML automation
- Edge computing & digital twins
- Real-time processing



Business Models

- Products → Platforms
- Data → Intelligence
- Ownership → Ecosystems
- Value migration upward



Competitive Patterns

- Boundary dissolution
- Big Tech entry
- Democratization
- Speed acceleration







1. Technology Chain Transformation

Commercial Space Revolution

- ✓ What's Changing: Satellite constellation costs have dropped 90%, making daily global coverage affordable
- Impact on Countries: Data scarcity is no longer a barrier; the challenge shifts to data processing and analysis capacity
- ✓ UNIGIF Connection: Pathway 4
 (Data) and Pathway 5
 (Innovation) guide how to access
 and utilize this abundance

AI/ML Revolution

- What's Changing: Automated feature extraction, real-time change detection, and predictive analytics are now standard
- Impact on Countries: Manual mapping processes become obsolete; AI skills become critical national capacity
- UNIGIF Connection: Pathway 8 (Capacity & Education) ensures workforce readiness for Al-driven geospatial

Edge Computing & Digital Twins

- What's Changing: Real-time processing enables smart cities, disaster response, and infrastructure monitoring
- Impact on Countries:
 Opportunity to leapfrog traditional systems directly to digital twin platforms
- UNIGIF Connection: Pathway 6 (Standards) ensures interoperability in digital twin implementations

The challenge shifts from data access to data intelligence







2. Business Model Chain Transformation

From Products to Platforms

- ✓ Industry Shift: Companies moving from selling data to providing intelligence-as-aservice
- ✓ Country Opportunity: Access sophisticated analytics without building full infrastructure
- ✓ **UNIGIF Strategy:** Pathway 7 (Partnerships) guides public-private collaboration models

Ecosystem Economics

- ✓ Industry Shift: No single company controls the full value chain; partnerships essential
- ✓ Country Opportunity: Nations can become orchestrators, connecting capabilities rather than owning all
- ✓ UNIGIF Strategy: Pathway 1 (Governance) establishes frameworks for ecosystem coordination

Value Migration

- Industry Shift: Margins expanding in analytics/solutions, declining in raw data
- Country Opportunity: Focus national investment on highvalue interpretation, not just collection
- UNIGIF Strategy: Pathway 3 (Financial) optimizes resource allocation to high-return areas

Result: 95% cost reduction, better coverage, faster updates. This is the leapfrogging opportunity.







3. Competitive Pattern Transformation

Boundary Dissolution

- ✓ Industry Shift: Tech giants (Google, Amazon, Microsoft) entering geospatial; geospatial companies becoming Al companies
- Country Opportunity: Leverage big tech infrastructure while maintaining sovereignty over critical data
- ✓ UNIGIF Strategy: Pathway 2 (Policy & Legal) balances innovation access with data sovereignty

Democratization

- Industry Shift: Advanced capabilities no longer limited to wealthy nations or large enterprises
- Country Opportunity: Smaller countries can achieve world-class systems through smart partnerships
- UNIGIF Strategy: All 9 pathways collectively enable "smart follower" strategies

Speed of Change

- Industry Reality: Technology cycles now 18-24 months, not 5-10 years
- Country Challenge: Government procurement and planning cycles are misaligned with the innovation pace
- UNIGIF Strategy: Pathway 5 (Innovation) promotes agile governance approaches

The challenge shifts from data access to data intelligence







The question is not whether transformation will happen—it's happening now. The question is whether your country will lead it, adapt to it, or be left behind by it.

UNIGIF as Your Strategic Framework

9 Pathways to Navigate Transformation

Why UNIGIF Matters Now

Designed for exactly this type of disruption—helps countries navigate complexity rather than prescribing rigid solutions.

- Bridges technology & governance
- Enables smart partnerships
- Proven implementation road map

The countries that will thrive in the next decade are those that start now—using UNIGIF as their guide, learning from peers, partnering strategically, and building national geospatial capabilities as essential infrastructure for the digital age.

UNIGIF provides the framework. The commitment must come from you.



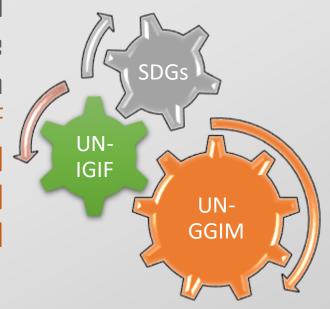




I. UN-GGKIC

Established by an agreement between the United Nations and the Government of the People's Republic of China on 20 May 2022

Develop and promote the required knowledge, innovation, and leadership to strengthen the adoption of geospatial information to support the implementation of national development priorities and the SDGs, leveraging the United Nations Integrated Geospatial Information Framework (UNIGIF)







UN-IGIF



The UN Integrated Geospatial Information Framework is a comprehensive guide that enables countries to develop, strengthen, and promote efficient use of geospatial information for policy formulation, decision-making, and innovation.

VISION

The efficient use of geospatial information by all countries to effectively measure, monitor and achieve sustainable social, economic and environmental development – leaving no one behind

MISSION

To promote and support innovation and provide the leadership, coordination and standards necessary to deliver integrated geospatial information that can be leveraged to find sustainable solutions for social, economic and environmental development

UN-IGIF officially adopted by UN-GGIM at its eighth session in August

Implementation Guide refined and finalized at the tenth session

Continuous evolution through the High-Level Group (HLG-IGIF)

7 Underlying Principles

Fundamental values guiding implementation Strategic Goals

High-level objectives for geospatial information management

9
Strategic Pathways
Specific areas of focus
for implementation



Integrated Geospatial
Information Framework
Framework
Why?

The bilde of the second secon

What?

National (or sub-national on Plans/Delivery System

Step Country-level

Action Plans

How, when, who?

Part 3

Part 1 Part 2

The Integrated Geospatial Information Framework comprises a 3-part document set as separate, but connected, documents The Overarching Strategic Framework is fully developed following a global consultation. The structure and main elements of the Implementation Guide are developed for in-principle approval. The Country-level Action Plans are work in progress.

Strategic Framework

Provides overarching guidance with 7 principles, 8 goals, and 9 pathways

Implementation Guide

Detailed roadmap with specific actions, templates, and best practices

Country Action Plans

Customized implementation strategies for individual member states

UN-IGIF: Three interconnected parts

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Why?

Part 1

Implementation Guide

Detailed roadmap with specific actions, templates, and best practices

What?

Part 2

Country-level Action Plans

How, when, who?

Part 3

- Adopted by UN-GGIM in August 2018, the Overarching Strategic Framework sets the context of 'why' geospatial information management is a critical element of national social and economic development, and 'why' it needs to be strengthened.
- This is the strategic policy guide to reference when developing and strengthening national and sub-national geospatial information management systems and capabilities. It presents a forward-looking and aspirational geospatial framework built on national needs and circumstances.
- As a 'strategic' introduction to the UN-IGIF, the intended audience includes **national leaders, political leaders, organizational managers, the business community and academia,** and defined benefits that take account of national priorities.
- > Adopted by UN-GGIM in September 2020, the Implementation Guide explains 'what' specific guidance and options can be taken by countries in implementing the UN-IGIF.
- Expanding on each of the nine Strategic Pathways, the Guide captures strategic to operational needs with references, good practices, guiding principles, actions, deliverables, outcomes and resources for countries to establish 'nationally' integrated geospatial information frameworks in such a way that transformational change is enabled, visible and sustainable.
- Recognizing that every country is at different levels of maturity in their geospatial development journey, the guidance is comprehensive, but general enough to be applicable to all countries, and sufficiently flexible so that each country can develop their own **Action Plans to meet their national priorities** and circumstances.
- Includes elements such as the economic impact and value of geospatial information systems, investment needs and priorities, identification of short, medium and long-term activities, and potential funding sources.
- Countries prepare and implement the UN-IGIF with their own country-level Action Plans (CAPs) that align with the country's priorities and circumstances. A CAP references the specific guidance, options and actions provided in the Implementation Guide and addresses each of the Strategic Pathways, while taking into account the strategic and operational needs of a country when implementing the UN-IGIF.

9 Strategic Pathways

Governance

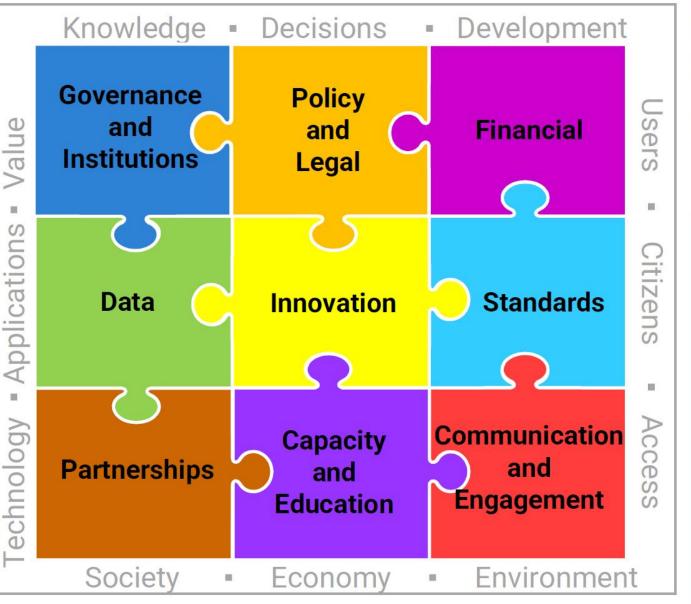


Technology I



People I







Anchored by 9 Strategic Pathways, the IGIF is a mechanism for articulating and demonstrating national leadership in geospatial information, and the capacity to take positive steps. The **Strategic Pathways** 'implement' the IGIF through actions.



UN-IGIF: 9 Strategic pathways

Governance Institutions

Strategic Pathway 1

Establishes the leadership, governance model, institutional arrangements and a clear value proposition as a means to strengthen multi-disciplinary and multi-sectoral participation and a commitment to achieving an Integrated Geospatial Information Framework.

Objective is to attain political endorsement, strengthen institutional mandates and build a cooperative data sharing environment through a shared understanding of the value of an Integrated Geospatial Information Framework, and the roles and responsibilities to achieve

Governance Model	Leadership
Institutional	Value
Structures	Proposition

Data

Strategic Pathway 4

Establishes a geospatial data framework and custodianship guidelines for best practice collection and management of integrated geospatial information that is appropriate to cross sector and multidisciplinary collaboration.

Objective is to enable data custodians to meet their data management, sharing and reuse obligations to government and the user community through the execution of well-defined data supply chains for organizing, planning, acquiring, integrating, managing, maintaining, curating, publishing and archiving geospatial information.

curating, publishing and archiving geospatial information

Fundamental Data Themes	Custodianship, Acquisition and Management
Data Supply Chain Interlinkages	Data Curation and Delivery

Strategic Pathway 7



Establishes effective cross-sector and interdisciplinary cooperation, industry and private sector partnerships, and international cooperation as an important premise to developing a sustainable Integrated Geospatial Information Framework.

Objective is to create and sustain the value of geospatial information through a culture based on trusted partnerships and strategic alliances that recognize common needs and aspirations, and national priorities.



Strategic Pathway 2



Establishes a robust legal and policy framework that is essential to institute appropriate national geospatial information legislation and policy that enables the availability, accessibility, exchange, application and management of geospatial information.

Objective is to address current legal and policy issues by improving the laws and policies associated with, and impact on, geospatial information management; proactively monitoring the legal and policy environment, particularly with regard to designating official responsibility for the production of data, and with respect to issues raised by emerging technologies and innovative and creative use of geospatial information.



Financial

Strategic Pathway 3

Establishes the business model, develops financial partnerships, and identifies the investment needs and funding sources for delivering integrated geospatial information management, as well as recognizing the benefits realization milestones that will achieve and maintain

Objective is to achieve an understanding of the implementation costs and ongoing financial commitment necessary to deliver integrated geospatial information management that can be sustained and maintained in the longer term.





Strategic Pathway 5

Recognizes that technology and processes are continuously evolving; creating enhanced opportunities for innovation and creativity that enable governments to quickly bridge the digital divide.

Objective is to stimulate the use of the latest cost-effective technologies, process improvements and innovations so that governments, no matter what their current situation is, may leapfrog to state-of-the-art geospatial information management systems and practices.



Strategic Pathway 6



Establishes, and ensures the adoption of, best practice standards and compliance mechanisms that enable legal, data, semantic and technical interoperability, which are fundamental to delivering integrated geospatial information and knowledge creation.

Objective is to enable different information systems to communicate and exchange data, enable knowledge discovery and inferencing between systems using unambiguous meaning, and provide users with lawful access to and reuse of geospatial information.



Strategic Pathway 8

Capacity Education

Establishes enduring capacity building programs and education systems so that geospatial information management and entrepreneurship can be sustained in the longer term.

Objective is to increase the awareness and level of understanding of geospatial information science. This includes developing and strengthening the skills, instincts, abilities, processes and resources that organizations and communities require to utilize geospatial information for decision-making.



Strategic Pathway 9



Recognizes that stakeholders (including the general community) are integral to the implementation of integrated geospatial information management systems and that their buy-in and commitment is critical

Objective is to deliver effective and efficient communication and engagement processes to encourage greater input from stakeholders to achieve transparent decision-making processes when implementing the Geospatial Information Management Framework.



information for decision-making.

Geospatial Information Management Framework.



Three interconnected parts

Overarching Strategy Why? Part 1 Implementation Guide

What?

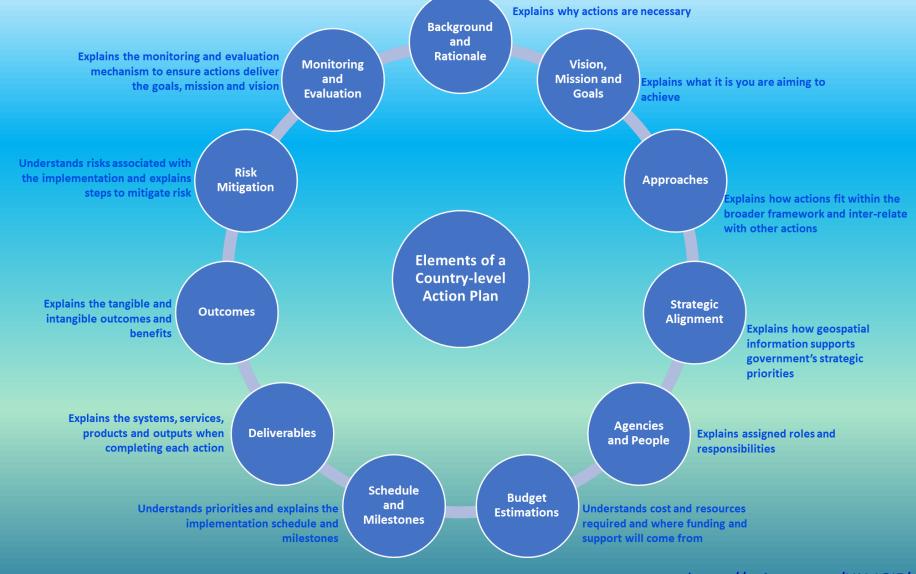
Part 2

Country-level
Action Plans

How, when, who?

Part 3

ELEMENTS OF A COUNTRY-LEVEL ACTION PLAN



https://ggim.un.org/UN-IGIF/

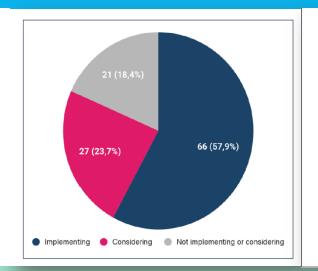
UN-IGIF adoption and implementation Current status

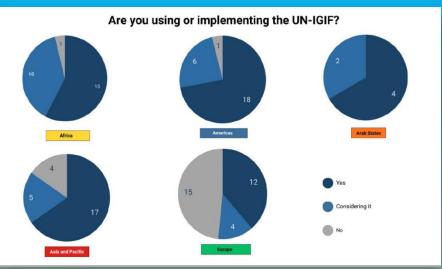
GGIM Survey (2023) A **total of 114** UN-GGIM Member States Global Implementation The framework is being implemented across multiple regions, with particular focus on developing countries that are benefiting mostly from structured Guidance materials, Institutional Support and geospatial capacity building

Progress Advancing the UN-IGIF

Member State Implementations







Key Success Factors

Executive Support: High-level government commitment
Phased Implementation: Gradual, manageable rollout
Multi-stakeholder Engagement: Inclusive planning processes
International Cooperation: Learning from global best practices
Sustainable Financing: Long-term funding mechanisms

Guidance Materials

- ✓ Comprehensive Implementation Guide
- ✓ Good practice templates
- ✓ Technical standards
- ✓ Capacity building resources

Institutional Support

- ✓ High-Level Group (HLG-IGIF) & UNGGKIC
- ✓ Regional Committees & Networks
- ✓ International partnerships
- ✓ Country-level customization

UNIGIF's Role in Industry Transformation



Bridging Technology & Governance

- Standards for Innovation: Ensures AI/ML models, digital twins, and real-time processing adhere to interoperability standards
- **Policy Frameworks:** Guides nations in creating legal structures for data sharing in the cloud era while protecting sovereignty
- Risk Mitigation: Provides governance guardrails as commercial space democratizes satellite access



Enabling Market Opportunities

- Public-Private Partnerships: Framework encourages governmentindustry collaboration, creating new business models
- Capacity Building: Expands the skilled workforce needed for emerging technologies, growing the talent pool
- Market Standardization: Reduces fragmentation, making it easier for solutions to scale globally



Accelerating Digital Transformation

- National Spatial Data Infrastructure: Guides countries in building cloud-based, API-first geospatial platforms
- Innovation Pathway: Explicitly addresses emerging tech (AI, big data, IoT) integration with traditional geospatial systems
- **SDG Monitoring:** Creates demand for geospatial analytics, driving market growth in sustainability sectors



Strategic Alignment Tool

- **For Governments:** Roadmap to harness commercial innovation while maintaining control and security
- For Industry: Visibility into national priorities and procurement direction across 100+ countries
- For Investors: Framework signals where public funding will flow, derisking private investment





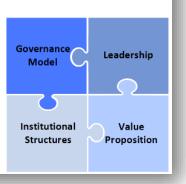




Pathway 1: Governance and Institutions

Establishes the leadership, governance model, institutional arrangements and a clear value proposition as a means to strengthen multi-disciplinary and multi-sectoral participation and a commitment to achieving an Integrated Geospatial Information Framework.

Objective is to attain political endorsement, strengthen institutional mandates and build a cooperative data sharing environment through a shared understanding of the value of an Integrated Geospatial Information Framework, and the roles and responsibilities to achieve the vision.



Role: Establish organizational structures for geospatial management

Transformation Leverage

- Agile Governance Models: Create structures that can adapt to 18-month technology cycles
- Cross-Sector Integration: Break down silos between mapping agencies, IT departments, and innovation labs
- Public-Private Coordination: Establish governance that enables partnerships without losing public interest oversight

Action for Policymakers

- Establish a National Geospatial Coordination with rotating industry advisory seats
- Create fast-track procurement authorities for emerging technologies (AI, cloud, satellite data)
- Designate a high level Geospatial Information Officer with cross-agency authority









Pathway 2: Legal and Policy

Establishes a robust legal and policy framework that is essential to institute appropriate national geospatial information legislation and policy that enables the availability, accessibility, exchange, application and management of geospatial information.

Objective is to address current legal and policy issues by improving the laws and policies associated with, and impact on, geospatial information management; proactively monitoring the legal and policy environment, particularly with regard to designating official responsibility for the production of data, and with respect to issues raised by emerging technologies and innovative and creative use of geospatial information.



Role: Data sharing and privacy regulations

Transformation Leverage

- Data Sovereignty in Cloud Era: Policies that protect national interests while enabling cloud-based innovation
- Al Ethics & Bias: Frameworks for responsible use of geospatial Al
- Public-Private Data Flows: Clear rules enabling commercial partnerships without compromising security

Action for Policymakers

- Develop "data residency" policies that specify what must stay local vs. what can use global cloud
- Create regulatory sandboxes for testing Al-driven geospatial applications
- Establish clear guidelines for government use of commercial satellite imagery (resolution limits, security protocols)

Critical Consideration

- ✓ Many countries' current regulations were written before cloud computing and AI
- ✓ Review and update legal frameworks to enable, not block, modern approaches.









Pathway 3: Finance

Establishes the business model, develops financial partnerships, and identifies the investment needs and funding sources for delivering integrated geospatial information management, as well as recognizing the benefits realization milestones that will achieve and maintain momentum.

Objective is to achieve an understanding of the implementation costs and ongoing financial commitment necessary to deliver integrated geospatial information management that can be sustained and maintained in the longer term.



Role: Secure funding for national mapping programs

Transformation Leverage

- ROI Demonstration: Use commercial pricing collapse to show government data should be free/low-cost
- **Investment Optimization:** Shift from capital-intensive infrastructure to operational spending on analytics and insights
- Blended Finance Models: Combine public funding with private investment in geospatial platforms

Action for Policymakers

- Commission economic impact studies showing geospatial data's multiplier effect (typically 3-5x GDPimpact)
- Shift budget from satellite purchases to commercial data subscriptions + analytics capacity
- Establish geospatial innovation funds that co-invest with private sector in national priority applications

Investment Optimization

- ↓ Capital infrastructure (satellites, servers)
- † Operational spending (subscriptions, analytics)
- † Capacity building (skills, training)

Blended Finance Models

- · Public funding for fundamental data
- · Private investment in applications
- · Innovation funds (co-investment)
- · PPP for platform development

UK Model: Shift from owning satellites to "intelligent buyer" of services

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Pathway 4: Data

Establishes a geospatial data framework and custodianship guidelines for best practice collection and management of integrated geospatial information that is appropriate to cross sector and multidisciplinary collaboration.

Objective is to enable data custodians to meet their data management, sharing and reuse obligations to government and the user community through the execution of well-defined data supply chains for organizing, planning, acquiring, integrating, managing, maintaining, curating, publishing and archiving geospatial information.



Role: Ensure availability of geospatial datasets

Transformation Leverage

- From Scarcity to Curation: Focus shifts from data creation to data quality and integration
- Open Data as Economic Driver: Free fundamental data enables private sector innovation
- Real-Time Data Strategies: Integrate static datasets with dynamic IoT and satellite feeds

Action for Policymakers

- Implement "open by default" policies for government geospatial data
- Establish data quality standards aligned with international frameworks
- Create national geospatial data catalogs with API access (not just download portals)
- Partner with commercial providers for high-frequency imagery rather than building satellites









Pathway 5: Innovation

Recognizes that technology and processes are continuously evolving; creating enhanced opportunities for innovation and creativity that enable governments to quickly bridge the digital divide.

Objective is to stimulate the use of the latest cost-effective technologies, process improvements and innovations so that governments, no matter what their current situation is, may leapfrog to state-of-the-art geospatial information management systems and practices.



Role: Encourage adoption of new technologies

Transformation Leverage

- Al-First Strategy: Make geospatial AI a national priority (like cybersecurity or renewable energy)
- Innovation Procurement: Use government as early adopter to stimulate local industry
- Experimentation Culture: Create environments where failure is acceptable in pursuit of breakthrough solutions

Action for Policymakers

- Launch national geospatial AI challenges with prize funding
- Establish innovation labs within mapping agencies with different rules than core operations
- Create "GovTech" accelerator programs specifically for geospatial startups
- Implement "buy innovative" procurement clauses allowing purchase of unproven but promising technologies







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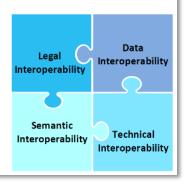




Pathway 6: Standards

Establishes, and ensures the adoption of, best practice standards and compliance mechanisms that enable legal, data, semantic and technical interoperability, which are fundamental to delivering integrated geospatial information and knowledge creation.

Objective is to enable different information systems to communicate and exchange data, enable knowledge discovery and inferencing between systems using unambiguous meaning, and provide users with lawful access to and reuse of geospatial information.



Role: Adopt international geospatial standards

Transformation Leverage

- Interoperability Insurance: Standards prevent vendor lock-in as technology changes rapidly
- Al Standards Gap: Develop frameworks for geospatial Al model evaluation and validation
- Data Sharing Agreements: Standardized APIs and formats enable rapid partnership formation

Action for Policymakers

- Mandate OGC standards for all government geospatial platforms
- Participate in international AI standards development
- Require commercial partners to provide data in open formats, not proprietary
- Establish metadata standards that enable discoverability









Pathway 7: Partnerships

Establishes effective cross-sector and interdisciplinary cooperation, industry and private sector partnerships, and international cooperation as an important premise to developing a sustainable Integrated Geospatial Information Framework.

Objective is to create and sustain the value of geospatial information through a culture based on trusted partnerships and strategic alliances that recognize common needs and aspirations, and national priorities.



Role: Collaborate with stakeholders

Transformation Leverage

- Public-Private Innovation: Co-create solutions that neither sector could build alone
- **Tech Giant Engagement:** Strategic partnerships with Tech giants (Amazon, Alibaba,...) for infrastructure
- Academic Alliances: University partnerships for Al research and workforce development
- International Consortia: Join multi-country initiatives for shared platforms

Action for Policymakers

- Develop partnership playbooks with template agreements for common scenarios
- Create "trusted partner" programs with companies for rapid engagement
- Establish data sharing agreements with clear terms (government retains ownership, company can innovate)
- Join international initiatives (e.g, GEO, regional mapping organizations)

You Cannot Win Alone

Platform Partnerships

Government provides fundamental data; private sector builds applications Example: Open data + developer portals + hackathons

Co-Innovation Partnerships

Joint R&D on AI for disaster response with tech companies Example: MOUs with shared IP frameworks

Capacity Partnerships

Training programs with universities and industry Example: National geospatial academies

Infrastructure Partnerships

Cloud computing with hyperscalers (AWS, Azure, GCP)
Example: Government-wide framework agreements

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Pathway 8: Capacity and Education

Establishes enduring capacity building programs and education systems so that geospatial information management and entrepreneurship can be sustained in the longer term.

Objective is to increase the awareness and level of understanding of geospatial information science. This includes developing and strengthening the skills, instincts, abilities, processes and resources that organizations and communities require to utilize geospatial information for decision-making.



Role: Train geospatial professionals

Transformation Leverage

- Al Skills Imperative: Geospatial workforce must add data science, machine learning, and cloud computing
- Continuous Learning Culture: Technology changes too fast for one-time training
- Interdisciplinary Integration: Geospatial professionals must work with software engineers, data scientists, and domain experts

Action for Policymakers

- Establish national geospatial competency frameworks aligned with industry transformation
- Fund "reskilling" programs for existing workforce (GIS → GeoAI)
- Create university-industry partnerships for curriculum development
- Implement "rotation" programs where government staff work in the private sector and vice versa.

Core Geospatial

- Spatial analysis
- Remote sensing
- Cartographic
- Geodesy

Still Essential

New Essential

- Python
- Machine learning
- Cloud platforms
- · API design and

Critical gap

Emerging Skills

- Deep learning
- 3D modeling
- Digital twins
- Geospatial ethics

Build Gradually

Budget 20-30% for capacity: Training is infrastructure, not overhead

Rwanda: 200+ trained professionals annually through university partnerships









Pathway 9: Communication and Engagement

Recognizes that stakeholders (including the general community) are integral to the implementation of integrated geospatial information management systems and that their buy-in and commitment is critical to success.

Objective is to deliver effective and efficient communication and engagement processes to encourage greater input from stakeholders to achieve transparent decision-making processes when implementing the Geospatial Information Management Framework.



Role: Raise awareness of geospatial information value

Transformation Leverage

- ROI Storytelling: Use transformation success stories to secure ongoing investment
- Cross-Sector Engagement: Demonstrate value to health, agriculture, finance sectors (not just traditional users)
- Public Trust: Transparent communication about AI use, privacy protection builds social license

Action for Policymakers

- Develop case study library showing geospatial impact on national priorities (jobs, GDP, lives saved)
- Create executive briefings for non-technical leaders (ministers, CEOs, legislators)
- Establish regular stakeholder forums bringing together government, industry, academia, civil society
- Launch public-facing platforms showcasing geospatial applications (interactive dashboards, apps).

Strategic Communication: Know Your Audience



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Country Strategies

Different starting points require different approaches







Archetype 1: Resource-Constrained Countries

Characteristics

- Limited budgets
- Small existing geospatial capacity
- Urgent development needs

Strategy: "Smart Leapfrogger"

Skip legacy stages, adopt modern approaches directly

Priority Pathways

- 7 Partnerships Essential for capabilities
- **Data** Focus on fundamentals
- 2 **Policy** Enable private sector

\$10-25M

5-Year Total Budget

12-18mo

Time to Operational

50+

Trained Professionals

Rwanda Success: From minimal capacity to regional leader in 7 years through partnerships, open-source, focus on land administration

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Archetype 2: Middle-Income with Legacy Systems

Characteristics

- Existing but outdated infrastructure
- Skilled workforce on traditional approaches
- Pressure to modernize without abandoning investments

Strategy: "Modernization Bridge"

Dual operating model during transition

Priority Pathways

- 5 Innovation- Parallel track while maintaining legacy
- 8 Capacity- Reskill existing workforce
- **Governance** Manage transition

\$50-100M

5-Year Total Budget

30%

Operating Cost Reduction

5x

Service Delivery Speed

Netherlands Kadaster: Maintained operations while building Al-powered automation, achieved gradual transformation without disruption

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Archetype 3: Advanced Countries Seeking Leadership

Characteristics

- Mature geospatial infrastructure
- Well-developed industry ecosystem
- Goal: Global leadership & economic value capture

Strategy: "Innovation Leader"

Push boundaries, set standards, export expertise

Priority Pathways

- 5 Innovation- Technological boundaries
- 7 Partnerships- Ecosystem orchestration
- 9 **Communication** Thought leadership

\$200-500M

5-Year Investment

\$1B+

Industry Export Revenue

Top 3

Global Ranking

Singapore Virtual Singapore: Comprehensive digital twin, 60+ use cases, S\$2.4B economic value, international consulting contracts

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Key Takeaways

1 Technology Convergence Creates New Competitive Dynamics

The integration of Al, IoT, edge computing, and geospatial tech is blurring industry boundaries and enabling new entrants

2 From Data Scarcity to Data Abundance

Commercial space revolution has fundamentally changed pricing models and accessibility—competition now centers on intelligence, not data ownership

Al is Disrupting Every Part of the Value Chain

From acquisition to delivery, machine learning is automating manual processes and enabling real-time intelligence at scale

4 Strategic Response Required, Not Incremental Adjustment

Winners will reimagine business models entirely—defensive optimization of existing approaches will not be sufficient

UNIGIF provides the framework

UNGGKIC for implementation

The commitment must come from you.

Key Takeaway for Industry Leaders

UNIGIF is not just a government framework—it shapes the market environment in which geospatial companies operate. Understanding and aligning with UNIGIF pathways enables:

Market Intelligence

Anticipate government priorities and procurement trends

Partnership Opportunities

Position as enabler of national UNIGIF implementation

Risk Management

Ensure solutions meet emerging governance standards

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Thank you







Oct 21 Morning

Module 1 Policy Analysis & Strategic Construction



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