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La géo-intelligence au service de la résilience
Geo-intelligentie voor een veerkrachtige toekomst

Strengthening national geospatial information management at the institutional level

*Application of the
United Nations Integrated Geospatial Information Framework*

Professor Joep Crompvoets, KU Leuven

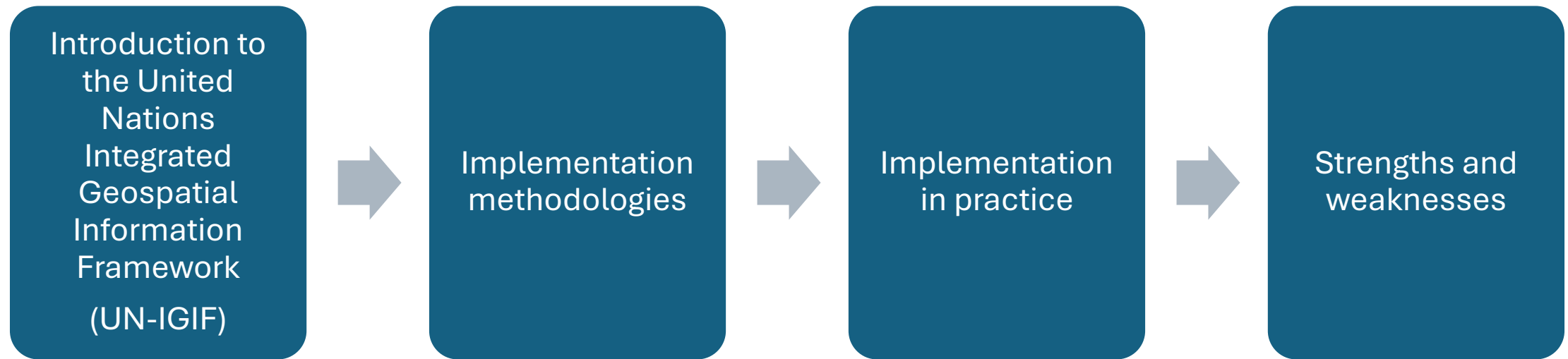
Johannes Van Geertsom, Nationaal Geografisch Instituut

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Outline and objectives



United Nations Integrated Geospatial Information Framework (UN-IGIF)



The United Nations Integrated Geospatial Information Framework (UN-IGIF) provides an overarching paradigm to further strengthen nationally integrated geospatial information management, not only for Member States that were in the early stages of adopting spatial data infrastructures but also for those that had already successfully implemented spatial data infrastructure capabilities.

(Eleventh session, Committee of Experts on Global Geospatial Information Management, August 2021)



UN-GGIM

United Nations Secretariat for the Committee of Experts on Global Geospatial Information Management

Positioning geospatial information to effectively address local to global challenges

ggim.un.org

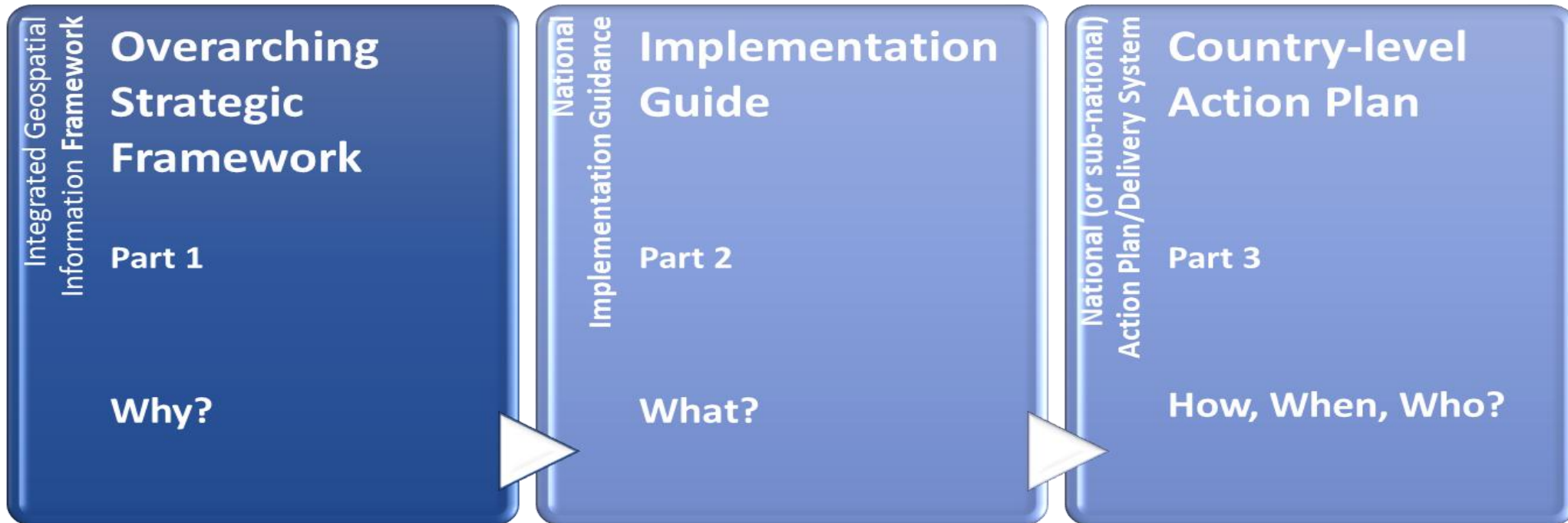


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United Nations Integrated Geospatial Information Framework



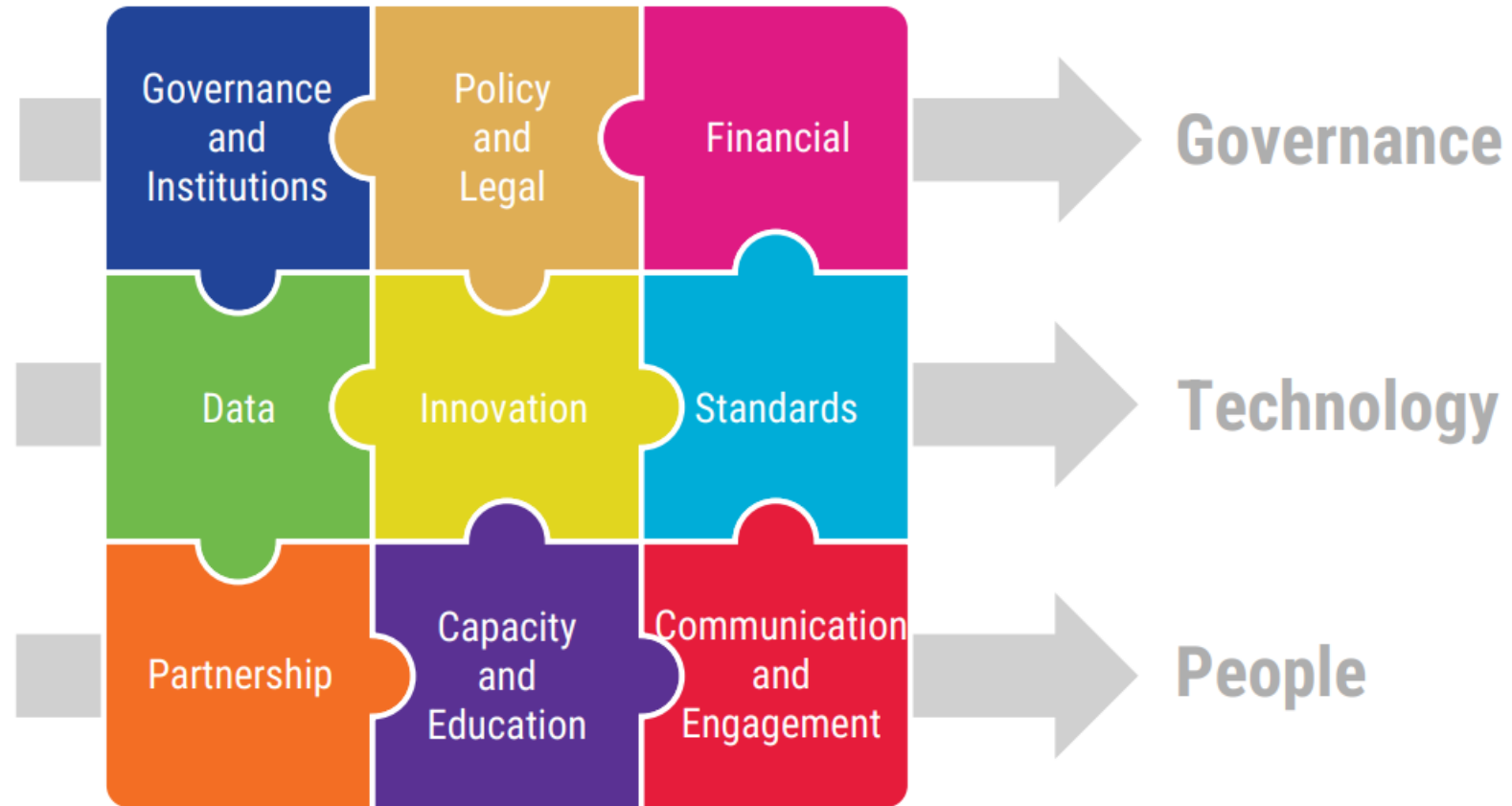
Part 1: Overarching Strategic Framework – **WHY** geospatial information is a critical element of national social and economic development and needs to be strengthened.

Part 2: Implementation Guide – **WHAT** actions can be taken to strengthen geospatial information management.

Part 3: Country-level Action Plans – **HOW** the actions will be carried out, **WHEN** and by **WHOM**.

United Nations Integrated Geospatial Information Framework (UN-IGIF)

9 Strategic Pathways

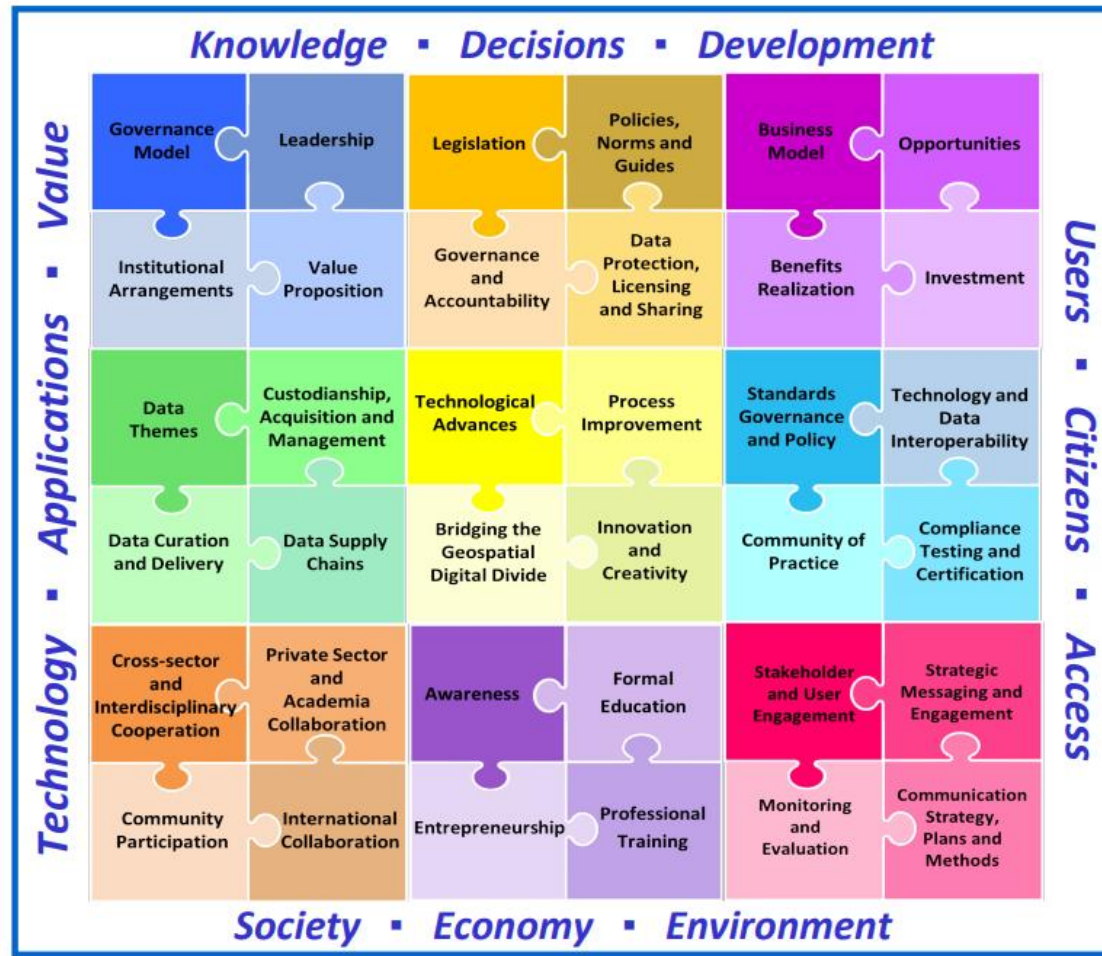


36 Key Elements

Governance →

Technology →

People →



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.



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Global Geospatial Information Management

Positioning geospatial information to address global challenges

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135 Guidance Actions for Implementation



Elements of Innovation	Technological Advances	Innovation and Creativity	Process Improvement	Bridging the Geospatial Digital Divide
Guiding Principles	Leadership Trust Digital Connectivity	Digital Literacy Collaboration Enablement	Empowerment Supportive Policies User-Centric	
Key Actions for Strengthening Geospatial Information Management	Geospatial Landscape Innovation Group Technology Maturity Index Strategic Alignment	Transformation Roadmap Modernizing Data Assets Modern Data Creation Methods Data Integration Approaches	Operationalizing Innovation National Innovation System Innovation Programs Innovation Hubs Process Improvement	Identifying Innovation Needs Monitoring Trends Technology Needs Assessment
Tools to Assist in Completing the Actions	IGIF Technology Maturity Index Capacity Framework Geospatial Drivers and Trends ICT Data Inventory	PEST and SWOT Analysis Modernizing Data Assets Modern Data Creation Methods Data Integration Approaches	Data Storage Processes Pillars of an Innovation Program Critical Path Analysis Open SDG Data Hubs	
Interrelated and/or Prerequisite Actions	Governing Board (SP1) Governance Model (SP1) Specialist Working Groups (SP1)	Geospatial Information Coordination Unit (SP2) Data Inventory (SP4) Data Gap Analysis (SP4)	Country-level Action Plan (SP3) Geospatial Information Management Strategy (SP1)	
Outcomes	Improved Processes for Data Collection, Management, Analysis and Distribution	Increased Productivity Through an Innovation Enabled Environment Improved Decision-Making	Ability to Bridge the Geospatial Digital Divide Innovative Workforce	

Elements of Governance and Institutions	Governance Model	Leadership	Value Proposition	Institutional Arrangements
Guiding Principles	Facilitate Strategic Outlook Credibility Participatory	Open and Transparent Accountability Guidance Clarity	Project Management Ownership Communication and Evaluation Legal Interoperability	
Key Actions for Strengthening Geospatial Information Management	Forming the Leadership Governance Board Geospatial Coordination Unit(s) Specialist Working Groups	Setting Direction Strategic Alignment Study Geospatial Information Management Strategy	Tracking Success Monitoring and Evaluation Success Indicators	Establishing Accountability Governance Model
Tools to Assist in Completing the Actions	Steering Committee Charter Example Strategic Alignment Template	Guidance for Vision, Mission and Goal Statements Country-level Action Plan	Monitoring and Evaluation Template Success Indicators Example	
Interrelated and/or Prerequisite Actions	Policy Framework (SP2) ICT Capacity Review (SP5) ICT Needs Assessment and Gap Analysis (SP5)	ICT Needs Assessment and Gap Analysis (SP5) Stakeholder Engagement Strategy (SP5) Legal and Policy Review (SP2)	Data Inventory and Gap Analysis (SP4) Socio-Economic Value Assessment (SP3)	
Outcomes	Strengthened Institutional Mandates and Political Buy-in	Efficient Planning and Coordination Geospatial Information is Valued	Cooperative Data Sharing	

Elements of Standards	Standards Governance and Policy	Technology and Data Interoperability	Compliance Testing and Certification	Community of Practice
Guiding Principles	Leadership Compliance Governance Engagement	Collaborative Modernized Practice Interoperability Scalable	Usability Responsive Extensible Open and Accessible	
Key Actions for Strengthening Geospatial Information Management	Direction Setting Standards Governance Framework Standards Awareness Strategic Goals	Planning for Change Action Plan Institutional Arrangements Communication Plan Capacity Building	Ongoing Management Standards Review Program Community of Practice Capacity Building	Understanding National Needs Baseline Survey Standards Inventory Needs Assessment and Gap Analysis
Tools to Assist in Completing the Actions	National Governance Model Questionnaire Standards Baseline Survey Needs Assessment and Gap Analysis Template	Rules and Responsibilities for National Standards Governance Standards Training, Tools and Related Resources	User Community Case Studies and Statements of Benefits Community Best Practice Examples	
Interrelated and/or Prerequisite Actions	Governing Board (SP1) Geospatial Information Coordination Unit (SP1) Specialist Working Groups (SP1)	Data Framework (SP4) Data Inventory Template (SP4) Data Inventory Questionnaire (SP4) Checklist for Creating Metadata (SP4)	Join/Build a Community of Practice/Capacity Building Methods (SP8) Communication Plan (SP9)	
Outcomes	Minimized Barriers to Data Sharing and Integration Improved Update of Geospatial Information	Rapid Modernization of New Data and Technologies Efficiencies in Geospatial Data Production and Lifecycle Management	Enhanced Abilities to Share Geospatial Information and Address Issues of Common Importance	

Elements of Policy and Legal	Legislation	Policies, Norms and Guides	Data Protection, Licensing and Sharing	Governance and Accountability
Guiding Principles	Available and Compatible Accessible and Equitable	Stewardship and Trust Strategic and Responsible Optimize Value and Resources Secure and Safeguarded	Future Proof and Resilient Policy Coherence and Legal Interoperability	
Key Actions for Strengthening Geospatial Information Management	Providing Leadership Review Group	Addressing Opportunities Design and Develop Data Sharing and Dissemination Licensing Geospatial Information	Addressing Coherence Intellectual Property Rights Privacy and Data Protection Liability Concerns Sensitive Information	Future-Proofing Delivering Compliance Impact Assessment
Tools to Assist in Completing the Actions	Common Legal Terms Review and Assessment Considerations Review and Assessment Questions	Use Case Example Gaps and Opportunities Analysis Gap Analysis Matrix Policy and Legal Instruments	Assessing Fitness for Purpose for a Policy Managing Intellectual Property Rights Addressing Sensitive Information	
Interrelated and/or Prerequisite Actions	Governing Board (SP1) Geospatial Coordination Unit (SP1)	Geospatial Information Management Strategy (SP1) Specialist Working Groups (SP1)	Identify Key Stakeholders (SP9) Stakeholder Analysis (SP9)	
Outcomes	Sound and Enabling Policy and Legal Environment Maximizes Utility of Geospatial Information with Safeguards	Mandates and Responsibilities Clarified Strengthened Governance and Accountability	Effective, Secure Management and Application Responsive to Changes and Progress	

Elements of Partnerships	Cross-sector and Interdisciplinary Cooperation	Private Sector and Academia Collaboration	International Collaboration	Community Participation
Guiding Principles	Mutual Respect, Trust and Understanding Leadership, Commitment and Empowerment	Shared Vision and Goals Learning and Development Transparency and Communication	Clarity and Realism of Purpose and Scope Performance Management and Accountability	
Key Actions for Strengthening Geospatial Information Management	Understanding Partnership Need for Partnering Types of Partnership	Identifying Potential Partners Preliminary Screening Initial Engagement	Formalizing Partnership Establishing Agreement Communication Plan Governance Structure	Enabling Opportunities Partnership Opportunities Selection Criteria
Tools to Assist in Completing the Actions	Stakeholder Identification and Analysis Types of Partnerships	Evaluation of Potential Partners Success Indicators	Communication Plan Review and Evaluation	
Interrelated and/or Prerequisite Actions	Geospatial Information Management Strategy (SP1) Policy and Legal Review and Assessment (SP2) Sources of Funding; Business Case (SP3) Data Gap Analysis (SP4)	Data Acquisition Program; Data Governance; Storage and Retrieval Systems ; Data Release (SP4) Data Acquisition Alternatives; Technology Needs Assessment (SP5)	Geospatial Innovation Systems; New Product and Services (SP5) Capacity Needs Assessment (SP8) Stakeholder Identification; Stakeholder Analysis; Communication Plan (SP9)	
Outcomes	Increased Development Capacity Expanded Capability	Sharing, Learning and Knowledge Transfer Empowered Creativity and Innovation	Enhanced Organizational Knowledge, Expertise and Proficiencies Agility and Flexibility	

Elements of Financial	Business Model	Opportunities	Investment	Benefits Realization
Guiding Principles	Adherence Accountable Transparent	Leadership Responsive Credible	Collaborative Stewardship Sustainable	
Key Actions for Strengthening Geospatial Information Management	Setting Direction Financial Governance Financial Accountability Strategic Assessment Current Operating Treatment Current Business Model Data Policy Public Good	Financial Plan Desired Business Model Financial Planning Case for Investment Socio-Economic Impact Assessment Business Case Investment Appraisal Annual Budget	Secures of Funding Sources of Funding Strategic Opportunities Deriving Value Benefits Realization Communicate Benefits	
Tools to Assist in Completing the Actions	IGIF Current and Desired Future Dual-Response Survey IGIF Baseline Survey World Bank/IFSD Diagnostic Tool	Business Model Canvas Developing a Business Model - Some Considerations Geospatial Program Budget Socio-Economic Impact Assessment Approach	Components of a Business Case Developing an Annual Budget - Considerations Possible Financing Models	
Interrelated and/or Prerequisite Actions	Governing Board (SP1) Geospatial Coordination Unit (SP1) Governance Model (SP1) Specialist Working Group (SP1)	Review Group (SP2) Country-level Action Plan (SP3) Data Sharing and Dissemination (SP2)	Geospatial Information Management Strategy (SP1) Strategic Alignment Study (SP1)	
Outcomes	Investment plan with funding sources, obligations, and estimates for future years	New funding initiatives identified to meet national geospatial information priorities	Financial accounting of costs associated with all aspects of national geospatial information program	Socio-economic value of geospatial information is defined, and aligned to financial plan to realize benefits

Elements of Capacity and Education	Awareness	Formal Education	Professional Training	Entrepreneurship
Guiding Principles	Responsible Relevant Responsive	Objective Inclusive Holistic	Collaborative Coordinated Resilient	Incentivized Sustainable Accountable
Key Actions for Strengthening Geospatial Information Management	Setting Direction Capacity and Education Working Groups Target Groups	Conducting Assessments Capacity Development and Education Strategy Planning for Action Apprenticeship Reviewing Existing Programs Outreach Initiatives	Taking Action Community of Practice Innovation Hubs and Incubators Geospatial Industry Challenges Geography in Schools Scholarships and Internships	Assessing Value Monitor and Evaluate
Tools to Assist in Completing the Actions	Knowledge-Skills-Resource Matrices for Organizations and Teams Capacity Scanning Matrix	Incremental Approach to Needs Assessment/Analysis Gap Analysis Approach to Needs Assessment/Analysis PEST and SWOT Analysis	Typical Components of a Capacity Development and Education Strategy Types of Capacity Development Approaches Recording Success Indicators for Capacity Development	
Interrelated and/or Prerequisite Actions	Geospatial Coordination Unit (SP1) Specialist Working Groups (SP1) Governance Model (SP1) Design and Develop (SP2)	Data Sharing and Dissemination (SP2) Innovation Hubs (SP2) Potential Partners, Preliminary Screening and Initial Engagement (SP7)	Communication Strategy (SP9) Communication Plan (SP9) Stakeholder Identification (SP8)	
Outcomes	Broad geospatial awareness and capabilities at all levels Increased adoption and application of geospatial technologies and services	Stimulate creativity and innovative solutions to address real-world challenges, including economic opportunities and growth, and wellbeing of society	Equipped with increasing knowledge, proficiency and skills in geography and geospatial sciences, technology and services	

Elements of Data	Data Themes	Custodianship, Acquisition and Management	Data Supply Chains	Data Curation and Delivery
Guiding Principles	Consistent Identification Quality Management	Metadata Standards Accessibility Reusable Formats	Authenticity Timeliness Provenance Integrity	Demand Driven Efficiency Security Respected Rights
Key Actions for Strengthening Geospatial Information Management	Getting Organized Data Framework Data Inventory Data Profiles	Capturing and Acquiring Data Data Capture Data Acquisition Program	Maintaining Accurate Positioning Maintained Geospatial Infrastructure	Planning for the Future Data Gap Analysis Data Theme Road Map
Tools to Assist in Completing the Actions	Fundamental Geospatial Data Themes Data Theme Description Data Inventory Questionnaire Data Profile Template Geo-Analytic Matrix	Data Theme Road Map Template Data Guidelines by Policy Principles Data Governance Roles Data Management Plan Elements	Metadata Creation Checklist Data Release Guidelines Guidance for Improving Geospatial Infrastructure Global Statistical Framework Geospatial Data Integration	
Interrelated and/or Prerequisite Actions	Country Strategy (SP1) Country-level Action Plan (SP1) Governance Model (SP1) Geospatial Steering Committee (SP1)	Geospatial Information Coordination Unit (SP1) Policy Framework (SP2) Licensing Methods (SP2) New Data Capture Methods (SP5)	Storage Solutions (SP3) Metadata Standards (SP4) Establishing Partnerships (SP7) Identify Key Stakeholders (SP9)	
Outcomes	Increased Range and Scope of Geospatial Data	A Critical Mass of Centrally Coordinated Data Cost Reduction Through Productivity Improvements	Ability to Monitor and Measure Progress Towards Achieving the SDGs	

Elements of Communication and Engagement	Stakeholder and User Engagement	Strategic Messaging and Engagement	Communication Strategy, Plans and Methods	Monitoring and Evaluation
Guiding Principles	Trusted and Transparent Personal and Participatory	Inclusive and Impartial Meaningful and Timely	Coordinated and Consistent Adaptable and Responsive	Purposeful and Effective
Key Actions for Strengthening Geospatial Information Management	Providing Leadership Engagement Strategy Steering Group Internal Communication	Setting Direction Policy Platform Geospatial Brand Strategic Messages	Reviewing Progress Monitor and Evaluate Stakeholder Surveys	Communicating Value Benefits Analysis Lessons Learned
Tools to Assist in Completing the Actions	Categories of Stakeholders Identifying and Classifying Stakeholders	Stakeholder Analysis Matrix Stakeholder Analysis and Communication	Communication Plan Communication Methods	Communication Methods - Advantages and Disadvantages Review and Evaluation; Benchmarking
Interrelated and/or Prerequisite Actions	Geospatial Information Management Strategy (SP1) Specialist Working Groups (SP1)	Governing Board (SP1) Socio-Economic Impact Assessment (SP2)	Geospatial Coordination Unit (SP1) Benefits Realization Plan (SP3)	
Outcomes	Heightened Awareness and Active Engagement	Engaged, Inclusive and Participatory	Positive and Beneficial Relationships	Increased Opportunities, Innovations and Accomplishments



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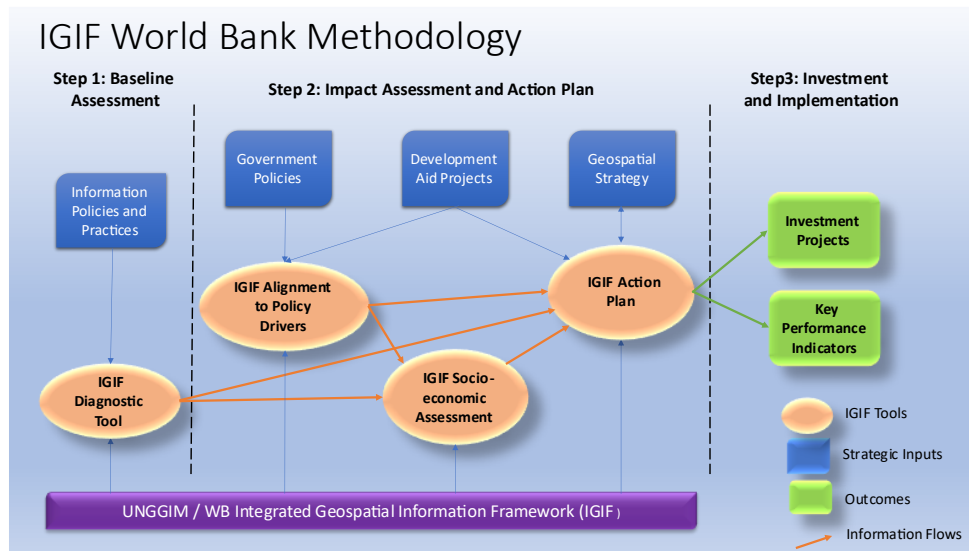
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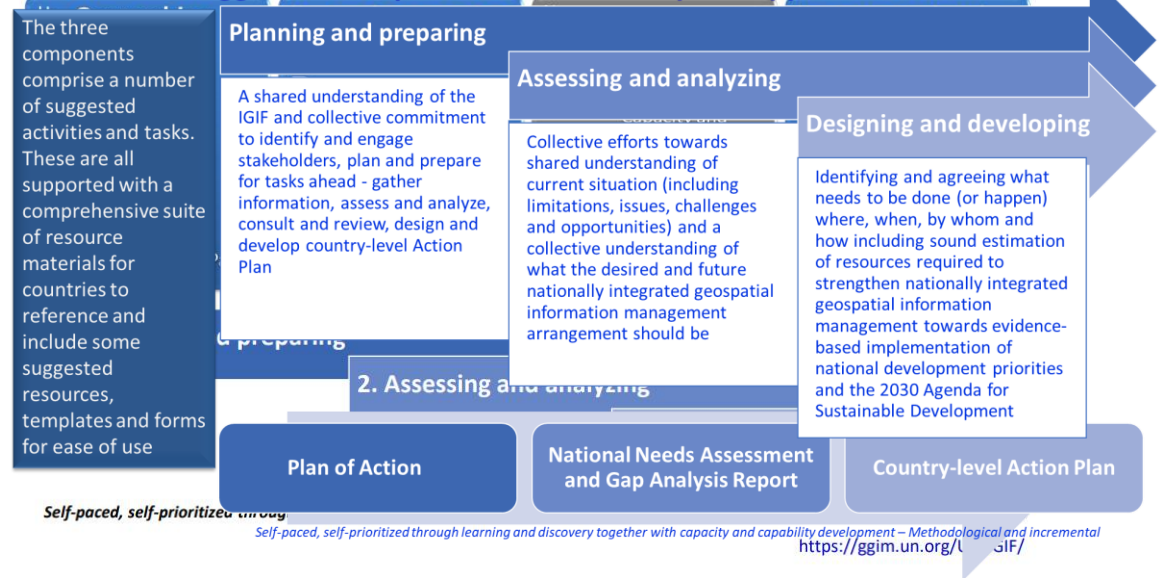
Implementation of UN-IGIF - Methodology

World Bank Methodology



Self-paced country led approach

The suggested components of a Country-led approach

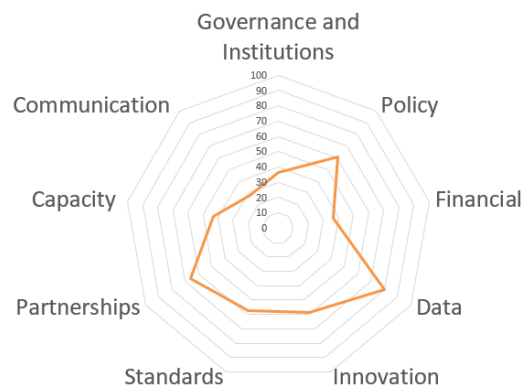


UN-IGIF in practice: Belgium

National level:

- *Workshop held in January 2024 (baseline assessment tool)*
- *Project led by KU Leuven with support of NGI following the World Bank Methodology*

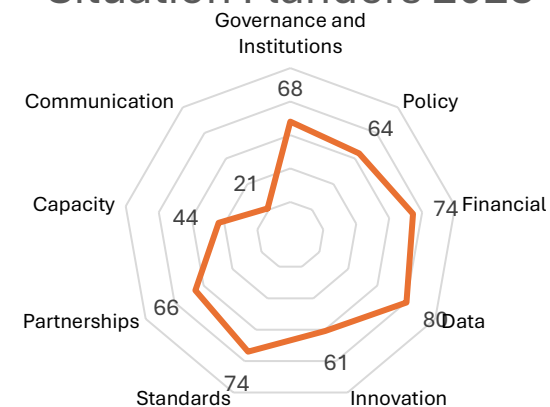
Situation Belgium 2024



Flanders (Flagis):

- *2023 Workshop -> baseline assessment (limited depth due to time constraint)*
- *February 2024 follow-up workshop -> defined actions for the three weakest strategic pathways*

Situation Flanders 2023



UN-IGIF in practice: Senegal

Multiple projects from 2022-2024 (World Bank)

- **Project team:** University KU Leuven, National Geomatics Institute of Senegal

World bank methodology: Used tools & templates

- Baseline Assessment
- Geospatial Alignment to Policy Drivers
- Socio Economic Impact Analysis (SEIA)
- Country Level Action Plan

Implementation of the CLAP

- Strengthening governance: Groupe Interinstitutionnel
- Update of existing National Geomatics Plan
- Linking to existing funding available for Space (SEN S)

Action 1.1 Re-evaluate the GICC		
<p>The GICC is a significant factor in Senegal and performs major geospatial tasks. It is important to evaluate its current functioning and establish a clear vision for the future.</p> <p>It is necessary to evolve from a consultation and coordination group to an institution anchored at the highest level (see Action 1.2). Indeed, given the multi-sectoral nature of Geographic Information, it would be wiser to entrust the implementation of the plan to a transversal structure, capable of guiding policy and ensuring coordination, with a consequent endowment of resources.</p>		
Tasks	Results	Resources
<ul style="list-style-type: none"> • Clarify the GICC's mandate and stakeholders' responsibilities; • Review the structure of the GICC and determine whether it is achieving its objectives; • Expand the group to include other data-producing or data-holding institutions, as well as operational companies. 	<p>A strong organization that represents all stakeholders and acts with legitimacy.</p>	<p>The resources needed to carry out the tasks set out in the actions include material, human and financial resources</p>

Action 1.2: Institutionalizing and formalizing leadership		
<p>In order to establish an effective and sustainable geospatial information framework in Senegal, it is imperative to institutionalize leadership and roles (to avoid any ambiguity). It is strongly recommended that leadership as an institution be formally anchored at the highest, cross-cutting level of government policy coordination (e.g. the Premature), so that it is clear who has the power to make key decisions and define future strategic actions.</p>		
1.2.1 Create or set up an IDG/S committee/management body		
<p>Senegal needs a high-level body to provide leadership and direction for the strengthening of geospatial information management, as well as the implementation and ongoing operations and management of the NSDI for the benefit of all citizens, businesses and government.</p> <p>It is recommended that the responsibilities of the governance body be divided into executive and managerial/operational entities - for example, a high-level executive board comprising representatives of government and key stakeholders making key (strategic) decisions, and a management board responsible for planning, facilitation, monitoring and operational tasks. It is important that significant resources are allocated to support the governance and management of such an approach.</p> <p>A decree should be drafted for the creation of the IDG/S committee. The proposed decree of the "Haut Conseil de l'Information Géographique du Sénégal (HCIGS)" could serve as a basis in this respect.</p>		
Tasks	Results	Resources
<ul style="list-style-type: none"> • Define roles and responsibilities and code of conduct; • Appoint delegates; • Approve the action plan; • Prioritize the development and negotiation of investment proposals; • Oversee implementation progress; • Deal with conflicts requiring decision; • Provide guidance when program changes are required 	<p>Committee charter ;</p> <p>Governing body/Committee composed of two parts:</p> <ul style="list-style-type: none"> • High-Level Executive Council: strategic decisions • Board of Directors: operational tasks (planning, facilitation, follow-up). 	<ul style="list-style-type: none"> • Costs of drafting the decree (including the charter) 1 Person/Month consultant (see also the "Haut Conseil de l'Information Géographique du Sénégal (HCIGS)" decree proposal) ; • Person/Month (PM) is the "human effort" (measure of time) devoted by an organization's key personnel to a specific project or task. The PM rate is one of the key figures for correctly defining the budget when submitting a proposal. Correctly calculating the rate of remuneration for personnel



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UN-IGIF in practice: Benin

Project 2026 (Funded by The Netherlands)

- **Project team:** Kadaster, University KU Leuven, National Geographic Institute of Benin

World bank methodology: Used tools & templates

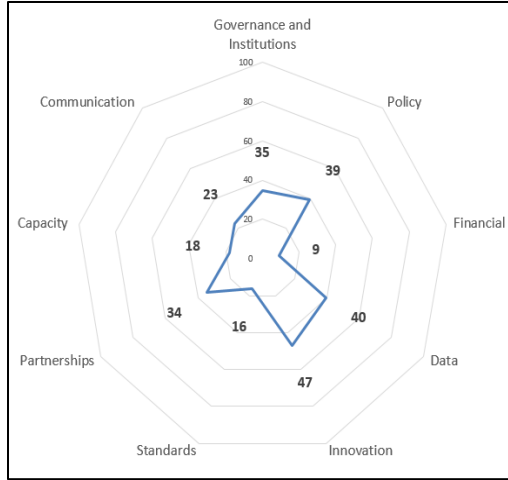
- Baseline Assessment
- Country Level Action Plan

Implementation of the CLAP

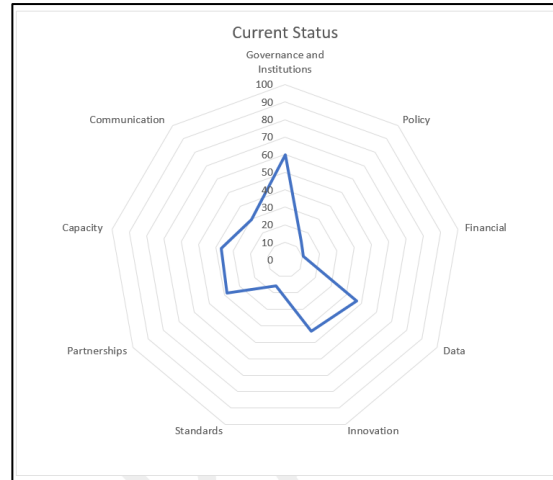
- Strengthening governance: National Geographic Institute of Benin
- Linking with Land Administration

UN-IGIF Application results – Baseline results

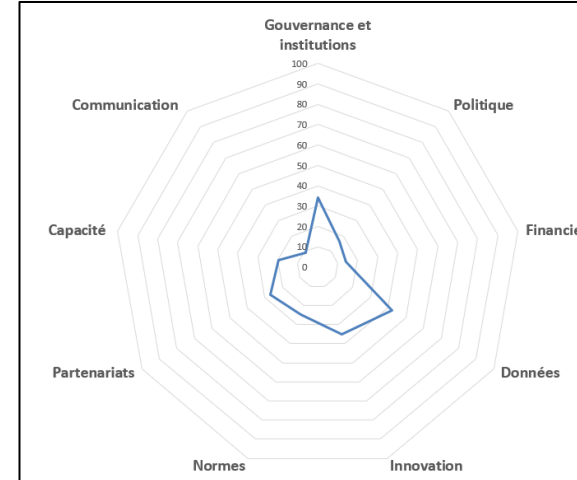
St. Lucia



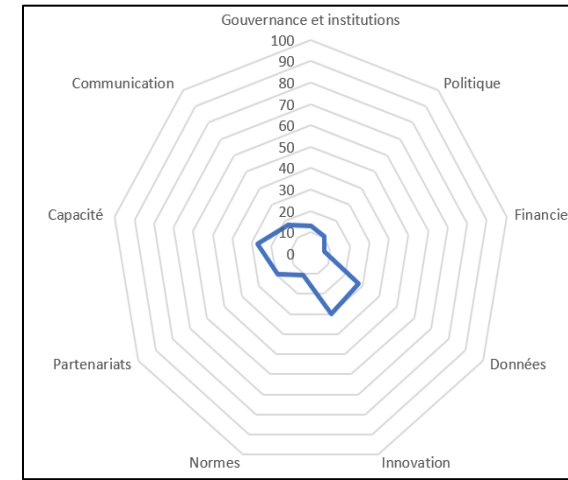
Senegal



Benin



Djibouti



Moldova



2023

Serbia









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UN-IGIF in practice: Conclusions

 Advantages	 Challenges
 Strong reference guide Supports development and strengthening of national spatial data infrastructures	 Extensive materials and tools Requires time to fully understand and apply
 Global framework with credibility Developed by UN/World Bank, ensuring legitimacy and stakeholder buy-in	 Lack of concrete “quick wins” Limited examples of low-hanging fruits
 Clear and structured approach Provides a coherent framework for implementation	 Complex implementation in federal contexts Difficult to align with decentralized governance structures
 Ready-to-use templates & tools Saves time and ensures consistency across efforts	 Time-consuming process Requires sustained effort and coordination
	 Sensitivity to subjectivity Outcomes may vary depending on interpretation

Insights from implementation experience

Questions?



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