



INTEGRATED GEOSPATIAL INFORMATION FRAMEWORK

**A STRATEGIC GUIDE TO DEVELOP AND STRENGTHEN
NATIONAL GEOSPATIAL INFORMATION MANAGEMENT**

PART 2: IMPLEMENTATION GUIDE

[CONSULTATION DRAFT: WORK-IN-PROGRESS]

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PREAMBLE

Document Structure

This Implementation Guide is the second component of a three-part document that provides guidance for lower to middle income countries to reference when developing and strengthening their national and sub-national arrangements in geospatial information management, and for preparing specific national implementation plans for the Integrated Geospatial Information Framework (referred to in this document as the FRAMEWORK).

The FRAMEWORK comprises three parts as separate documents as demonstrated in Figure 1.

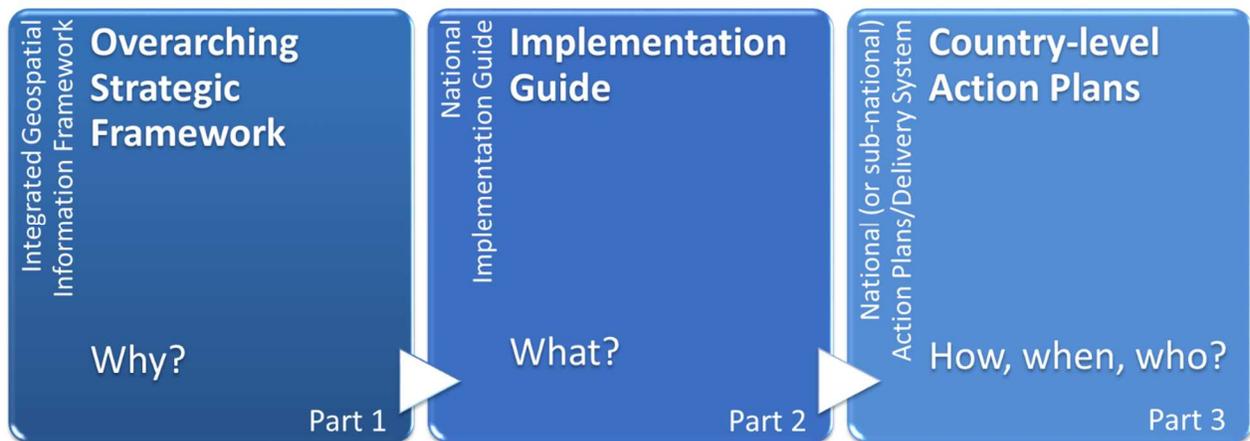


Figure 1: The 3 component documents of the Integrated Geospatial Information Framework.

Part 1: Overarching Strategic Framework presents a forward-looking framework built on national needs and circumstances, and provides the overarching strategic messages and more expansive and integrated national, and particularly policy, perspectives and elements of geospatial information. It provides and expresses the ‘why’ through the vision, mission, principles, benefits and efficiencies, and sets the context of why geospatial information management is a critical element of national infrastructure via seven (7) underpinning principles, eight (8) goals and nine (9) strategic pathways that lead to a national approach that takes account of national circumstances, priorities and perspectives. The Overarching Strategic Framework is intended for a wide range of stakeholders – these primarily being high-level policy and decision makers, institutions and organizations within and across government.

Part 2: Implementation Guide provides the ‘what’, the more detailed specifics and actions to be taken in implementing the FRAMEWORK. Expanding on each of the nine strategic pathways, the Guide comprises principles, reference guides and good practices for each of the strategic pathways. The aim is to provide guidance for governments to establish nationally integrated geospatial information frameworks holistically in countries in such a way that transformational change is enabled, visible and sustainable.

Part 3: Country-level Action Plans provide templates and guides to operationalize the FRAMEWORK in a national and sub-national context. Providing the ‘how, when and who’, this assists countries to prepare and implement their own country-level Action Plans taking into consideration national circumstances and priorities. The country-level Action Plans will include elements such as the economic impact and value of geospatial information systems, identification of investment needs, priorities, analysis of socio-economic benefits and potential funding sources.

Integrated Geospatial Information Framework

As illustrated in Figure 2, the Integrated Geospatial Information Framework aims to provide a basis and guide for lower to middle income countries towards developing and strengthening their arrangements in national and sub-national geospatial infrastructures.

It provides the strategic guidance that enables country specific action plans to be prepared and implemented.

The FRAMEWORK guides governments towards developing and strengthening arrangements in national geospatial information management for the wellbeing of people, planet and shared prosperity.

The FRAMEWORK allows collaborative efforts by governments and stakeholders, by producers and consumers of information, by commerce and citizenry, aligning with national development aspirations, needs of governments and global development agenda.

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.								
STRATEGIC DRIVERS								
National Development Agenda • National Strategic Priorities • National Transformation Programme • Community Expectations • Multilateral trade agreements • Transforming our World: 2030 Agenda for Sustainable Development • New Urban Agenda • Sendai Framework on Disaster Risk Reduction 2015 – 2030 • Addis Ababa Action Agenda • Small Island Developing States Accelerated Modalities of Action (SAMOA Pathway) • United Nations Framework Convention on Climate Change (Paris Agreement) • United Nations Ocean Conference: Call for Action								
UNDERPINNING PRINCIPLES								
Transparent and Accountable	Information Accessible and Easily Used	Strategic Enablement	Collaboration and Cooperation	Integrative Solution	Sustainable and Valued	Leadership and Commitment		
GOALS								
Effective Geospatial Information Management	Increased Capacity, Capability, and Knowledge Transfer		Integrated Geospatial Information Systems and Services		Enhanced Stakeholder Engagement and Communication			
International Cooperation and Partnerships Leveraged	Sustained Education and Training Programs		Economic Return on Investment		Enriched Societal Value and Benefits			
STRATEGIC PATHWAYS								
Governance and Institutions	Legal and Policy	Financial	Data	Innovation	Standards	Partnerships	Capacity and Education	Communication and Engagement
Value proposition Institutional arrangements Leadership Governance model	Data protection and licensing Implementation and accountability Norms, policies and guides Legislation	Benefits realization Investment Partnerships and opportunities Business model	Data curation and delivery Data supply chain interlinkages Custodianship, acquisition and management Fundamental geospatial data themes	Bridging the digital divide Promoting innovation and creativity Process improvement Technology and technological advances	Technical interoperability Semantic interoperability Data interoperability Legal interoperability	International collaboration Community participation Industry partnerships and joint ventures Cross-sectoral and interdisciplinary cooperation	Professional development and workplace training Entrepreneurship Formal education Awareness raising	Monitoring and evaluation Planning and execution Integrated engagement strategies Stakeholder identification
Knowledge Decisions Development Society Economy Environment Users Citizens Access Technology Applications Value								

Figure 2: Integrated Geospatial Information Framework.

Strategic Pathways

As demonstrated in Figure 3, the FRAMEWORK is anchored by nine strategic pathways within three main area of influence: governance; technology; and people. These nine strategic pathways seek to maximise the innovative and integrative nature of geospatial information by making it available and accessible to governments, community, businesses, academia, and civil societies innovate, co-create and develop new products, services, and applications that deliver new knowledge for evidence-based policy and decision-making.

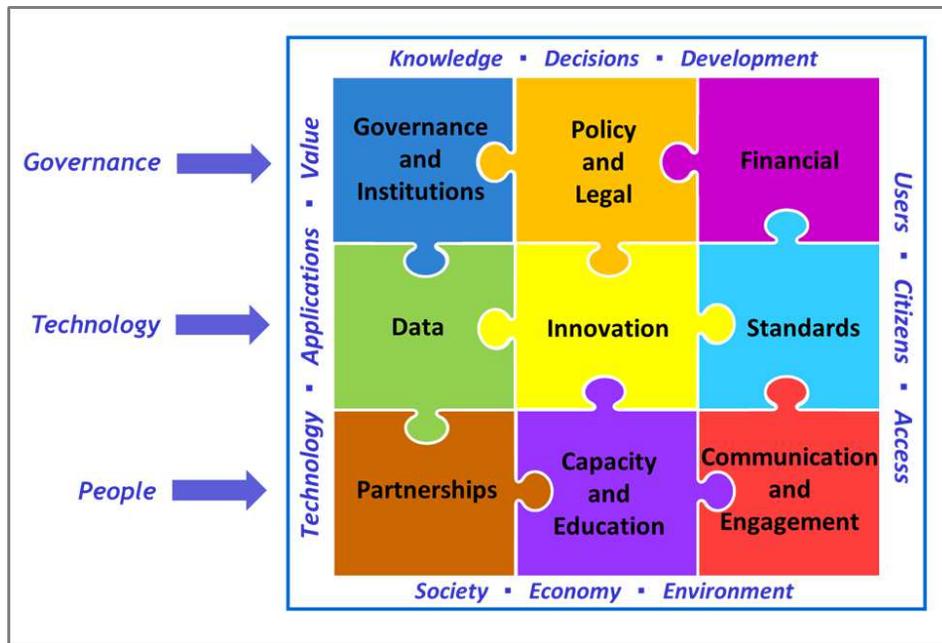
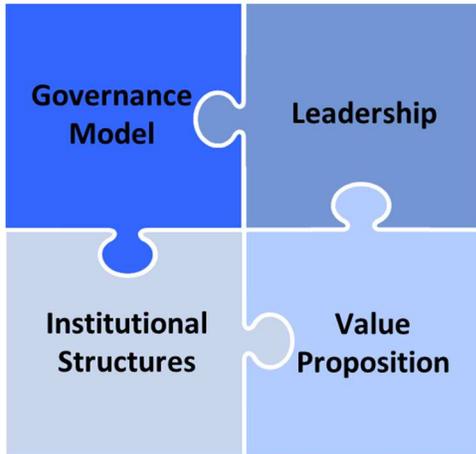


Figure 3: The Framework is anchored by nine strategic pathways as separate pieces of a jigsaw that, when joined together, enables the Integrated Framework to be connected and implemented.

The nine strategic pathways guide governments towards implementing integrated geospatial information management that deliver a vision for sustainable social, economic and environmental development.

In this **Implementation Guide**, specific guidance and recommended actions are elaborated for each pathway to assist countries in achieving the required results. The strategic pathways were presented as separate pieces of a jigsaw puzzle in recognition that there are many aspects, dimensions and considerations within each individual pathway, and that when brought together, the FRAMEWORK is an integrated whole of its many parts, leading towards multiple benefits when successfully implemented, cognizance that the effective use of geospatial information enables all governments to measure, monitor and achieve sustainable social, economic and environmental development; leaving no one behind.

1. GOVERNANCE AND INSTITUTIONS



This strategic pathway 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.

The 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.

Institutional arrangements are the agreements (formal and informal) by which governance, policies and some legislation are implemented. There exists an array of institutional arrangements to achieve good geospatial information management. The process of establishing these arrangements needs to be done with sensitivity to contextual variables within countries (e.g. sources of legitimacy for decision-making, resources, number of agencies involved, pre-existing inter-organizational relationships, etc.). This can happen at the country level, but should also happen through direct coordination between UN-GGIM and the other countries.

The United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) officially recognized the global importance of national governance and institutional arrangements in geospatial information management at its second session in August 2012. It identified the need for countries to examine institutional arrangements in geospatial information management and provided governments with several options on how to create a national governance strategy.

These options recognized that although institutional arrangements are a key component of governance, wider governance responsibilities of authority, decision-making and accountability need to be clearly defined throughout government and must include mechanisms for collaboration and outreach to non-public sector stakeholders, such as donors, private sector, civil society and NGOs.

It is good practice for all agencies involved in the collection and management of geospatial data and provision of services to establish institutional arrangements in a way that properly reflects the country's needs, priorities and resources. Such institutional arrangements should present a clear division of responsibilities and work among the organizations involved in geospatial information

management and the transactions and data sharing relationships between institutions as well as community groups and individuals that contribute to participatory mapping programs.

Institutional arrangements should be complimented by a legal framework, and they should build on the framework as necessary. Institutional arrangements should be periodically reviewed and improved to keep them relevant. An advisory committee, or similar body, should be established to support sound decision-making and to consider the interests of stakeholders.

This Strategic Pathway – Governance and Institutions discusses the importance of governance and institutional arrangements, and identifies several different approaches, considerations and the key components for effective geospatial information coordination and leadership.

1.1 Context and Rationale

The type of institutional arrangements appropriate for developing countries are shaped by several challenges. These include:

- weak link or communication gap between the political and policy levels of government and the geospatial information expert community;
- uncoordinated planning, design and implementation of development projects; weak political support; and
- fragmented land institutions managing geospatial information.

Geospatial information management in developing countries is typically highly fragmented across a number of institutions with many land related institutions responsible for urban, rural, forestry, cadastre, topographic mapping, statistics, ICT infrastructure, and remote sensing etc. In many cases these institutions are not willing to cooperate and there is no underlying culture of sharing information. This compounds the ability to agree on and implement common policies and standards across the country.

Access to geospatial information in developing countries is often inadequate as institutional barriers exist. National security is sometimes an argument to restrict access to some geospatial data. Similar challenges come from the restriction or ban on the use of unmanned aerial vehicles for geospatial information production in many countries. In addition, some form of monopoly on geospatial information production and use still exists, thus hindering the use by the private and academic sectors.

In terms of leadership, geospatial information management professionals have been poor in providing a narrative to politicians to explain geospatial information management benefits in political terms to gain support. Instead, the narrative is highly technical and does not articulate the social and economic benefits sufficiently. This lack of support is often further compounded by the politicians being wary of the transparency of information being placed on the policy agenda.

Typically, geospatial information management is the domain of the public sector in developing countries. However, due to lack of capacity these institutions are not delivering the required geospatial data, and this has created vacuums for other sources of geospatial data, such as the

private sector and crowdsourced data from civil society, to be increasingly used. More accommodating partnership models need to be encouraged and adopted to solve the lack of geospatial information.

1.2 Way Forward

The UN-GGIM Working Group on Trends in National Institutional Arrangements in Geospatial Information Management recognize the complexity and broad range of governance and institutional arrangements and concludes that there is no single universal solution or model that fits all countries. Nevertheless, successful approaches do have several common elements. These include:

- preparing national institutional arrangement guidelines and recommendations;
- formulating the framework of structural and managerial instruments used to establish recommendations to evaluate or improve management structures across governments; and
- identifying good practices and their applications across Member States

There are two different types of governance arrangements. One is a top-down approach that is highly focused on specific objectives. A top down “light” approach can be adopted by nations with limited resources. For example, rather than establishing a complex set of governance arrangements involving a wide range of stakeholders to enable effective geospatial information management across the entire public sector and beyond, this approach adopts a topics focused strategy, e.g. natural resource management, flood management and health, and builds a specific set of governance arrangements around the key stakeholders involved in these topic areas.

The second is a bottom-up approach that creates a framework for organic growth where there is little or no political support and just pockets of geospatial interest in public and private sectors, especially at the sub-national level, including cities. For example, cities within developing countries are the economic engines, but are also very vulnerable to climate change. The concentration of people and the risks they face today to natural disasters, such as floods, droughts, and heatwaves, will increase. These city initiatives tend to be donor driven, independent projects that lack coordination and adherence to geospatial policy frameworks. Therefore, this approach to governance arrangements needs to be established within the city institutional structures. The adoption of this approach to governance at the sub-national levels in developing countries would be enhanced through south to south twinning arrangements; this could be facilitated by UN-GGIM.

Over time, it is desirable that either of these approaches will migrate to a wider, more comprehensive set of national governance arrangements and enable a market for geospatial information.

1.3 Guiding Principles

Copying a successful institutional model from another nation is often not appropriate as there are different levels of development maturity and cultural aspects that need to be factored in. Nonetheless, there are certain principles and elements common to successful governance models and institutional arrangements.

The guiding principles for good governance and institutional arrangements is to stimulate consistent management, cohesive policies, guidance, processes and decision-rights for geospatial information management, and proper oversight and accountability.

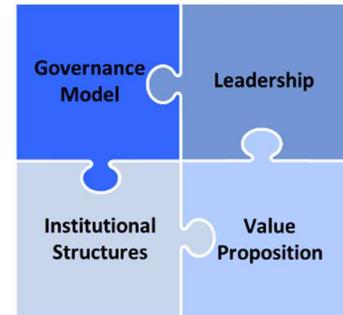
The guiding principles are:

- **Enablement:** An approach that focuses on strategic national imperatives, as well as, institutional requirements.
- **Participatory:** A governance model that is easily accessible and credible to participating institutions and the general public.
- **Collaboration:** Foster knowledge and cooperation within and among institutions predicated on a culture of openness and transparency.
- **Leadership:** A governance model that is driven from the top, so that participating institutions are well supported and guided in their daily tasks and decisions where the FRAMEWORK mandate is concerned.
- **Accountability:** Clear delegated levels of authority and roles and responsibilities for implementing the FRAMEWORK
- **Awareness:** An alertness to inter-agency cost-shifting where FRAMEWORK programs and development projects complement changing cross-government practices.
- **Transparency:** Regular cross-sector and cross-committee FRAMEWORK reporting and monitoring, complemented by re-evaluation of performance expectations and adjustments where necessary.
- **Adherence to Law:** Institutional structures and mandates interlinked with laws and policies.
- **Trusted:** Cultivate trust in the authoritativeness and reliability of public sector geospatial information
- **Best Practice:** to stimulate the exchange of best practices in national institutional arrangements in the context of geospatial information management

1.4 Elements

It is clear that a certain level of coordination in government – ideally with all levels of government (local – national – regional – global) is required to deliver a greater understanding of geospatial information and its importance.

The elements of good governance and institutional arrangements are:



Governance Model

A key outcome of the FRAMEWORK is the identification and acceptance by institutions of an agreed governance model. This model needs to meet accountability and outcome provisions of government and, at the same time, balance the need for effective collaboration across institutions in order to achieve the best outcome from a whole-of-government perspective.

Institutional Structures

Institutions need to be adequately mandated to acquire, administer, manage and deliver operations associated with geospatial information and decision-making; it includes an overview of the organizations involved and their roles and responsibilities in Geospatial Information Management, and the relationship between organizations as with producers, administrators and/or users of geospatial information.

Leadership

Leadership is realized through the implementation of a national strategy that clearly defines the country's strategic priorities that are supported through the use of geospatial information. To stimulate leadership, a "champion" (in government) is necessary to actively engage and promote geospatial information management across government organizations (at a local, national and global level), and with the private sector, academia, and local community.

Value Proposition

Understanding the value proposition of geospatial information in a country's specific context is key to achieving political buy-in and financial support. A value assessment is required to making the case for why geospatial information is a necessary government asset. The value assessment is a critical input to the financial investment process and business model.

1.5 Activities

Regardless of the approach to implementing FRAMEWORK governance and institutional arrangements, the leadership styles, and the value proposition of geospatial information to the country, there are some important activities that are common to all approaches. The following activities are suggested best practice.

1.5.1 Appoint a Steering Committee

Establish a Steering Committee (governing body) made up of members from across government to provide leadership and direction for implementing the Integrated Geospatial Information Framework. The committee structure should recognize that organizations that collect, manage and are significant users of geospatial information have a role to play.

A Committee Chair should be appointed to act as the spokesperson of the Committee and ensures that an appropriate level of dialogue occurs between institutions.

The committee requires a Terms of Reference, roles and responsibilities and code of conduct. A Steering Committee Charter for Geospatial Information Management is required to bring all Members It defines the committee's purpose, primary goals and objectives and will include:

- provide strategic direction and endorse overall policy and strategic plans for sharing spatial information;
- deliver whole of government strategic outcomes through the Coordination Unit (see 1.5.2) work plan and the implementation of operational strategies within Member Organizations;
- coordinate access to spatial information held by government departments and facilitate cross-sector consultation and liaison; and
- foster innovation, provide leadership and coordination, and promote standards necessary to build a spatial data infrastructure.

1.5.2 Establish a Geospatial Information Coordination Unit

Establish a Geospatial Information Coordination Unit (or Office) to coordinate and be accountable for all FRAMEWORK related activities. The Coordination Unit should be an independent body representing whole-of-government needs and not just the needs of a single Ministry or organization.

The Coordination Unit should preferably be accountable to and situated within a Ministry to be able to take full advantage of Ministry powers, financial services and human resource management. The Unit should have a Senior Responsible Officer (Director) appointed to 'champion' and provide oversight across all government projects involving the collection and management of geospatial information. The position should be as senior as possible, and include political support.

The Coordination Unit is responsible for;

- Formulating strategies and producing general standards, policies and guidelines for cross-government data management and access;
- Preparing institutional arrangement guidelines and recommendations;
- Building networks of people to continually improve the sharing of spatial information across the government sector and promote its use for sustainable development;
- Encouraging geospatial-related project sponsors to share experiences within and cross sub-national levels; a mix of data producers and users. This arrangement should be inclusive with crowdsourcing data communities and the private sector, where appropriate; and
- Using communication and engagement resources to reach out to a wider set of stakeholders, at the national and sub-national levels to publicize use cases and successes and to scale up the embryonic spatial data infrastructures.

1.5.3 Establish specialist working groups

Establish specialist working groups (or committees) to advise the Coordination Unit and Steering Committee. Working Groups will facilitate frameworks for wider sharing of geospatial data and their interoperability across institutions. The following are suggested.

- **Technical** - Provides advice on effective processes for the development of the technical aspects associated with data sharing and integration, and provides advice on the ongoing operational components of data exchange systems.
- **Data** - Provides advice on the management, organization, scope and development of the Fundamental Data Framework, monitor issues associated with spatial data collection and management, and develops and monitors the adoption of data standards for access to and use of geospatial data.
- **Policy** - Provides advice on matters relating to the Geospatial Information Legal and Policy Framework and its implementation, drafts legal and policy documents and provides advice on the review, approval, and promulgation of policies.
- **Financial** – Proposes effective and efficient methods of financing and investment for the operational sustainability of national and regional geospatial information management. Builds partnerships with donor organizations, commercial sector enterprises and academia to sustain the ongoing operations of geospatial information coordination.

1.5.4 Develop a Geospatial Information Management Strategy

The geospatial information strategy is an important first step towards identifying the vision, mission, and objectives of the geospatial information management initiative. It is a plan to achieve

the long term and overall aim of the Integrated Geospatial Information Framework and provides the direction for defining the institutional arrangements.

The strategy development should include the views of all stakeholder groups. Typically, this is achieved through a Strategic Workshop and a consultation process of the draft strategy where key stakeholder groups can have input to the strategy's development.

The strategy should include the case for change, significance and examples of benefits such as economic development, commercial opportunities and societal wellbeing, and consider specific legal and policy requirements.

The FRAMEWORK strategy should connect to other broader policy priorities of government (Environmental Policies, Financial Policies, Health Policies, etc.) in order to provide direction on where to focus and expend effort.

1.5.5 Develop a Change Strategy

Once the Strategy is complete, the change strategy is to be formulated. The Change strategy identifies the needs of the government with respect to geospatial information management and examines the current state of activities.

As part of the development of the Change Strategy the following tasks should be considered as the output of these tasks inform the change strategy. The suggested task to conduct are:

- A **Geospatial and Statistical Data Inventory** and Gap Analysis based on strategic needs and priorities.
- An **Institution Culture Assessment** and Gap Analysis to gauge whether stakeholders understand the reasons for the FRAMEWORK, and whether they view the FRAMEWORK as potentially beneficial and are in support of the changes required. It will then possible to determine what cultural changes may be required to implement FRAMEWORK.
- A **Data Acquisition and Supply Chain Assessment** to understand the vertical and horizontal data sharing and integration activities across institutions, and the role of the private and volunteering sectors in acquiring data and the conditions under which it can be used.
- A **Technology Review and Assessment** to understand the current technological capabilities for collecting, maintaining and sharing integrated geospatial information. This may include hardware, software, system interoperability, network and Internet connectivity and bandwidth as well as public interfacing open internet.
- A **Legal and Policy Review** to better understand the legal and policy changes necessary to implementing integrated geospatial information management and access.
- A **Capacity Assessment** to identify where skills fall short of requirements. Gaps in training and knowledge exchange among stakeholders are to be identified early to inform the Change Strategy (and will inform the capacity building plan).

The results from the above assessment tasks are necessary to better tailor the Change Strategy to the country's particular needs.

The Change Strategy also includes communication strategies designed to raise awareness and understanding of the FRAMEWORK benefits and opportunities and to ensure these benefits are communicated to decision-makers and stakeholders more broadly.

The Change Strategy is to clearly outline the current and proposed future state of integrated geospatial information management, capacity and education, data acquisition and supply chain strategies, legal and policy reform, and communication and engagement strategies.

1.5.6 Develop a Governance Model

The Governance Model is a diagram showing the interrelationships between the proposed institutions, committees and the FRAMEWORK Coordinating Unit.

The Governance Model is designed to bring national and municipal agencies together to share spatial information, reform cross-agency business processes and adopt latest ICT standards and systems. Ideally, the model should build on stakeholder participation and innovation, reduce data duplication across the government and project sectors, and maximize the use of spatial data at the national and local levels. Specifically, the Governance Model should provide guidelines for:

- Promoting an overall environment of collaboration across national and local government organizations;
- Providing a description of each institution and their delegated powers, and roles and responsibilities in respect to the FRAMEWORK;
- Identifying the key institutions along with their roles and responsibilities to effectively manage and implement coordinated management of geospatial information across all levels of government;
- Developing processes and procedures that serve as communication channels for geospatial information and knowledge sharing; and
- Developing institutional organizational models and regulations for effective management and sharing of spatial information across sectors.

The Governance Model may also include rules, procedures and other informational guidelines.

The adoption of a Governance Model for geospatial information management in developing countries is enhanced through twinning arrangements with developed countries; this could be facilitated by UN-GGIM.

1.5.7 Develop Country Action Plan

The Country Action Plan usually spread across appropriate horizon periods (e.g., 1-3 years, 3-5 years, 5+ years as relevant). Delivering integrated geospatial information is likely to a complex and time-consuming exercise and therefore the road map should be designed to grow capability over time. For each road map activity, the following should be identified:

- Agencies involved
- Objectives
- Outcomes expected
- Activities
- Deliverables
- Timeframe
- Operational Considerations
- Likely Risks to delivery, their likely severity and Risk Mitigation Actions
- Budget and Funding

1.5.8 Develop a Reporting Framework to monitor the achievement of Road Map outcomes

The reporting framework ensures regular monitoring of achievements towards attaining the FRAMEWORK goals. The reporting framework should:

- Identify the people and institutions involved in delivering and maintaining integrated geospatial information
- Provide the methodology and procedures for reporting
- Allow for incentives and disincentives for enabling successful integrated geospatial information management practices

1.5.9 Geospatial Economic Value Assessment

The Geospatial Economic Value Assessment enumerates the potential costs of implementing the FRAMEWORK and value of the anticipated benefits of the FRAMEWORK, and reflects trade-offs inherent in alternatives.

The assessment should provide a valuation of geospatial information in economic terms as this is necessary to achieving consideration in government policy.

An integrated economic analysis can capture hidden costs and benefits of geospatial information, as well as the synergies and institutional economies of scale that may be achieved through complementary policies that support sustainable development. For instance, the economic benefits to be derived from sustainable forestry practices may be considerable when geospatial information is used to study impacts and risks associated with different forestry practices. The study should also capture flow on benefits that relate to improved forestry management such as increased employment rates and poverty reduction as well as long-term environmental and

economic impacts of forest maintenance or depletion, as well as to the health costs of diseases associated with deforestation (WHO, 2004¹).

1.6 Deliverables

The following deliverables stem from the activities described above. They are typically a tangible product such as a report or other building block of the strategic pathway.

- An FRAMEWORK Steering Committee and agreed FRAMEWORK Steering Committee Charter
- An FRAMEWORK Coordination Unit appropriately staffed and with delegated powers, roles and responsibilities, and funding and computing resources
- Fully functioning FRAMEWORK Working Groups (or subcommittees) with specific Terms of Reference
- Integrated Geospatial Information Management Strategy
- Change Strategy
 - Data Inventory and Gap Analysis
 - Institution Culture Assessment and Gap Analysis
 - Data Acquisition and Supply Chain Assessment
 - Technology Review and Assessment
 - Legal and Policy Review
 - Capacity Assessment and Gap Analysis
- Detailed Country Action Plan
- Geospatial Economic Value Assessment Report
- Reporting Framework for effective multi-stakeholder monitoring of activities under the Road Map.

1.7 Outcomes

The desired outcome is -

- Implementation of the Integrated Geospatial Information Framework through effective leadership and coordination of government's geospatial information resources.

¹ WHO, 2004 Economic Assessment, Available at <http://www.who.int/heli/economics/en/>

1.8 Resources

At the 7th session of the Committee of Experts, the Working Group on Trends in National Institutional Arrangements presented a series of deliverables:

- a set of recommendations for implementing national institutional arrangements²;
- a methodology and approaches employed to prepare the national institutional arrangements framework, including instruments, principles and guidelines³;
- a compendium of good practices for national institutional arrangements⁴.

Case Study: Fiji:

Fiji established the Geospatial Information Council. The Council consists of senior officials of different organizations belonging to the policy domain of geospatial information management in order to collectively set out strategy and control the implementation of it. The Council is not confined to government ministries only but to also include Heads or Representatives of entities in the Private Sectors directly or indirectly involved in geographic information systems and remote sensing technology. The Council promotes and allows the sharing of key datasets for decision making under 5 areas; Strengthening of the existing government structures; Improvement of the fundamental geospatial data; Enabling access to fundamental geospatial data; Enabling interoperability of fundamental geospatial data; and Strengthening the human technical capacity of the industry.

² Chapter III in <http://ggim.un.org/meetings/GGIM-committee/7th-Session/documents/Agenda%207%20NIA%20Instruments,%20Principles%20and%20Guidelines.pdf>

³ <http://ggim.un.org/meetings/GGIM-committee/7th-Session/documents/Agenda%207%20NIA%20Instruments,%20Principles%20and%20Guidelines.pdf>

⁴ <http://ggim.un.org/meetings/GGIM-committee/7th-Session/documents/Agenda%207%20Compendium%20of%20NIA%20Good%20Practices.pdf>

2. POLICY AND LEGAL



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

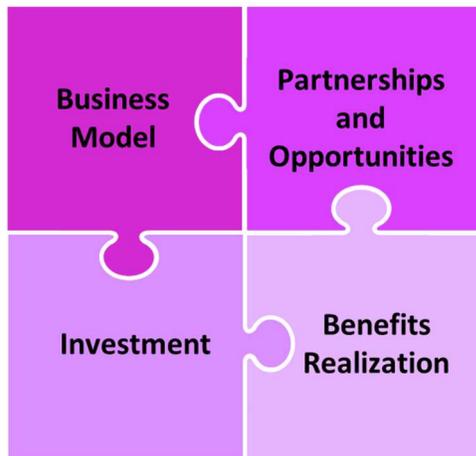
The objective is to address current legal and policy issues by improving the laws and policies associated with, and having an impact on, geospatial information management, and by proactively monitoring the legal and policy environment, particularly with respect to the issues raised by emerging technologies and the evolving innovative and creative use of geospatial information.

There are issues and challenges regarding the quality, organization, availability, accessibility, sharing and use of geospatial information, and these are common and experienced across various levels. Appropriate legal and policy frameworks on geospatial information management can assist to resolve or solve these problems. Furthermore, sound legal and policy frameworks can proactively support the development of geospatial information management so that decisions lead to the needed public good in a more efficient way.

Policies (both formal and informal), laws and regulations and legal instruments, ranging from treaties to geospatial information licensing arrangements, have a significant impact of geospatial information management. These can vary from policies and laws that directly relate geospatial information to those with much broader applications such as privacy, licensing and liability. International and regional obligations, such as treaties, play a part as well. Any geospatial information framework must understand the current policy and legal environment, the impact that it has on existing geospatial information management and what changes must be made in order to reach the desired outcome.

Note to Reviewer: This section is to be developed further.

3. FINANCIAL



This strategic pathway establishes the business model, develops financial partnerships, and identifies the investment points for delivering integrated geospatial information management, as well as recognizing the benefits realization milestones that will achieve and maintain momentum.

The 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.

The third strategic pathway of the FRAMEWORK describes the financing and sustainability of development and maintenance of national geospatial information. Nations will want to consider both the costs and financing of geospatial information management, but also the associated direct and indirect benefits that justify the expense.

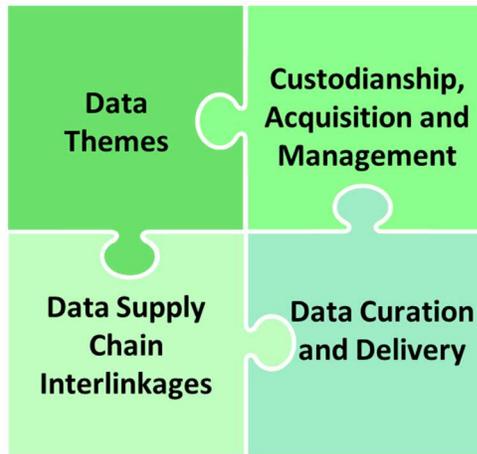
Nations want to consider both the costs and financing of geospatial information management, but also the associated direct and indirect benefits that justify the expense. It will be important that country-level action plans try to estimate cost involved, the return of investment, and the wider savings at the more local level.

A recent report commissioned by Google⁵ clearly demonstrates that the application of geospatial information has significant benefits outside of the traditional geospatial domain. It estimated worldwide and regional benefits for consumers (commuting and fuel efficiency, personal safety and purchasing efficiency), private industry (new products and services, productivity benefits, sales growth particularly for small businesses and tourism spend) and wider societal benefits (job creation, traffic congestion, urban planning, civic engagement, public health, safety & emergency response, disaster preparation and responsiveness, environment and wildlife preservation, knowledge creation and human capital development).

Note to Reviewer: This section is to be developed further.

⁵ The Economic Impact of Geospatial Services, AlphaBeta, September 2017, <https://www.valueoftheweb.com/reports/the-economic-impact-of-geospatial-services/>

4. DATA



This strategic pathway 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.

The 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, curating, publishing and archiving geospatial information.

Many developing nations do not have national availability of fit-for-purpose data for each of the relevant fundamental geospatial data themes. Nonetheless, developing nations have a unique opportunity to “leapfrog” more mature nations through the use of new data sources and data capture technologies and collaborative, multi stakeholder approaches between government, the private and academic sectors, NGO’s and volunteers.

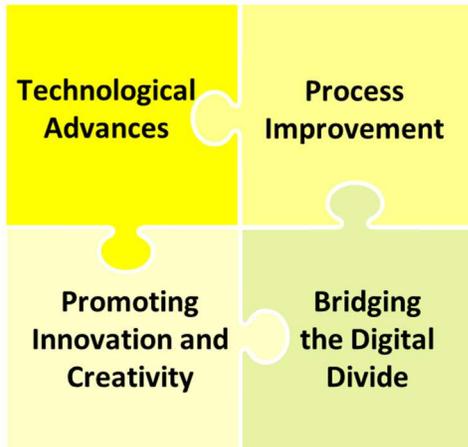
It is often stated that “data is the new oil”⁶ when it considered in terms of global and local economies. We are witnessing an exponential growth in the amount of data being generated and captured. Autonomous vehicles are true data creators; with all the sensors to enable the vehicle to drive without a driver, they generate around a gigabyte of spatially enabled data every second. Satellites capture imagery of the whole world every day, with volumes so large that data can only effectively be used in a cloud environment.

Users of social media are creating ever increasing amounts of spatially located information. Sharing a picture or updating a profile of where you are is not a conscious effort to create and provide geospatial information, but the user is being geo-referenced.

Note to Reviewer: This section is to be developed further.

⁶ <https://www.economist.com/news/leaders/21721656-data-economy-demands-new-approach-antitrust-rules-worlds-most-valuable-resource>

5. INNOVATION



This strategic pathway recognizes that technology and processes are continually evolving, creating enhanced opportunities for innovation and creativity that enable governments to quickly bridge the digital divide.

The objective is to stimulate the use of the latest 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.

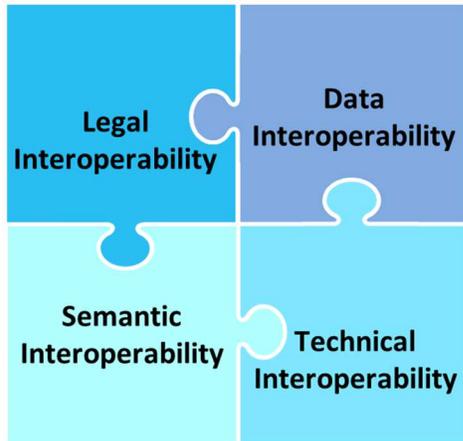
A number of important technology-driven trends are having a major impact in the geospatial industry, creating previously-unimaginable amounts of location-referenced information and questioning our very understanding of what constitutes geospatial information. These developments offer significant opportunities but also present challenges, both in terms of policy and in terms of law. Meeting these challenges and ensuring that the potential benefits can be realized by all countries will be important in ensuring that the full value of geospatial information can continue to be realized.

The private sector and the public will continue to play a significant role in providing the technologies and information required to maximize the opportunities available. They provide valuable, and in many cases unique, elements of geospatial information and the technologies and services required to maximize it, in addition to offering a growing understanding of the end-user base for geospatial information. Collaboration between all different actors in this wider geospatial industry will be crucial.

The Web of Data, smart devices and the increase in spatially related services have ushered in an era where public users are not only consumers of geospatial information, but also act as producers of enriched geospatial data. Previously the public had a limited consumption of geospatial information, but ubiquitous computing techniques are providing the infrastructure for the public to produce, distribute and consume geospatial information. This infrastructure provides seamless access from anywhere at any time, to easy-to-use geospatial information and services.

Note to Reviewer: This section is to be developed further.

6. STANDARDS



This strategic pathway establishes 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.

The 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.

Standards are a key strategic pathway of a geospatial framework. The use of standards is a critical means of enabling interoperability. Standards facilitate the open transfer of spatial data between data providers and users, and they ensure consistent connectivity within a geospatial information framework.

It is important for Nations to understand how standards work, and that standards are not static. To quote the UN-GGIM Guide to the Role of Standards in Geospatial Information Management: “Policymakers should also keep in mind that advances in technology inexorably change organizational structures, workflows and business models.

Today's SDI is different from yesterday's SDI. SDI 2.0 allows distributed or centralized approaches to fit the needs of users. It is built on Web services and online catalogues, not file transfers and manual clearinghouses. It is more adaptable for place-based decision-making. The pace of change requires new thinking about national SDI roles and investments, and a commitment to interoperability based on open standards is essential in dealing with this transition. Standards organizations continue to look at new technology and societal trends, for instance by developing best practices about how to make data from non-authoritative sources fit for decision making.

Note to Reviewer: This section is to be developed further.

7. PARTNERSHIPS



This strategic pathway establishes effective cross-sector and interdisciplinary cooperation, industry partnerships, community participation and international cooperation as an important premise to developing a sustainable Integrated Geospatial Information Framework.

The 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.

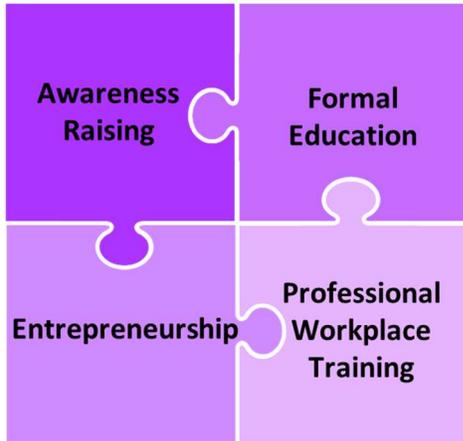
The 2030 Agenda for Sustainable Development called for multi-stakeholder partnerships, principally to enhance cross-sector and interdisciplinary cooperation for sustainable development at all levels. Multi-stakeholder partnerships mobilize and share knowledge, expertise, technology and also human and financial resources towards shared aim to achieve sustainable development in all countries, in particular developing countries, and at all levels.

This FRAMEWORK desires, encourages and promotes effective public, public-private and civil society partnerships, and this includes inter-agency and inter-industry partnerships and joint ventures as well as inter and intra-regional and international collaboration. These partnerships and multi-stakeholder participation builds on the knowledge, experience and resourcing networks of partners as a means to strengthen the implementation of national strategic and development priorities and the 2030 Agenda for Sustainable Development.

The establishment of networks, joint-ventures and cooperative arrangements between relevant stakeholders can identify and address, for example, technology needs and gaps, the access or transfer of relevant technologies, and can also include scientific and professional cooperation, innovation and capacity development. Strategic partnership gives a competitive advantage and an opportunity to access a broader range of resources and expertise that otherwise may not be available.

Note to Reviewer: This section is to be developed further.

8. CAPACITY AND EDUCATION



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

The objective is to raise awareness and develop and strengthen the skills, instincts, abilities, processes and resources that organizations and communities require to utilize geospatial information for decision-making.

Countries want to ensure sustainability of geospatial information management. This not only requires appropriate investment and longer-term funding (see Strategic pathway 3), but equally important the knowledge and capacity to take strategic decisions, develop the infrastructure, build and maintain the data and use geospatial information in its many applications.

More can be made of the expertise of human geographers, economic geographers and geospatial analysts, in developing the evidence base for regional and place-based approaches to economic growth and sustainable development.

Many existing frameworks and initiatives focus primarily on the development of the geospatial professional, however, skills and knowledge about geospatial information need to move from a limited specialist community into the mainstream of policy development, service design and systems delivery. It is possible to recognize three groups:

Capacity and Education are the basis of the human side of sustainable geospatial infrastructures. How do countries ensure that there is the appropriate leadership, technical skills, user awareness and best practice sharing required to have a vibrant “geospatial economy”? What are the consequences for education, research and other relevant funding?

Note to Reviewer: This section is to be developed further.

9. COMMUNICATION AND ENGAGEMENT



This strategic pathway recognizes that stakeholders are integral to the implementation of integrated geospatial information management systems and that their buy-in and commitment is critical to success.

The objective is to deliver effective and efficient communication and engagement processes to encourage greater input from stakeholders in order to achieve transparent decision-making processes when implementing the Integrated Geospatial Information Framework.

The challenge of ensuring the information needed by policymakers, researchers, civil society and companies is open, accessible and easily located is just one piece of the puzzle that can be constructed under a common approach through the Geospatial Information Framework. Another piece is reaching and educating data users so that they understand what information is available and how it can be applied in their work.

The dramatic growth in the awareness and use of spatial information has resulted in a significant expansion in the user community; geospatial specialists, data analysts and wide varieties of data users contribute to and use geospatial data. As discussed in earlier chapters of this Framework, there are many technical, legal and political issues, but also managerial, systemic and institutional issues that need to be addressed. Proper engagement and communication with all stakeholders is required for the successful implementation of integrated geospatial information management.

The issue of communication and engagement is even more important in developing nations, where the number of stakeholders can be significantly higher. Different agencies can be supported by a different donor, with potentially conflicting approaches to development and implementation of geospatial information.

Communicating plans, proposals, and results are important to the success of a geospatial information management program. Clearly outlining plans and proposals informs interested parties of the purpose and intent and encourages their support and concerns. Sharing results of plans, proposals and implementations indicates status of work, progress toward objectives, and benefits of the proposals to affected communities and encourages continued improvement and development.

Note to Reviewer: This section is to be developed further.

10. CONCLUSION

Note to Reviewer: This section is to be developed further.