Strategic Pathway 1

Governance and Institutions

*This **strategic pathway** establishes the leadership, governance model, institutional arrangements and a clear value proposition to strengthen multi-disciplinary and multi-sectoral participation in, 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 vision and understanding of the value of an Integrated Geospatial Information Framework, and the roles and responsibilities to achieve the vision.*

Summary

Geospatial information is increasingly being harnessed to interconnect and integrate government functions and commercial services - making cities more livable, citizens more engaged and informed, and agricultural areas more productive. Traffic congestion, weather reports, air pollution, bus locations, pest monitoring, flood sensors, and electricity outage applications are all underpinned by geospatial information that can be synthesized into a seamless knowledge environment so that information can be accessed quickly by users to make informed decisions. For government this means streamlining operations, reducing costs and improving overall economic and social sustainability.

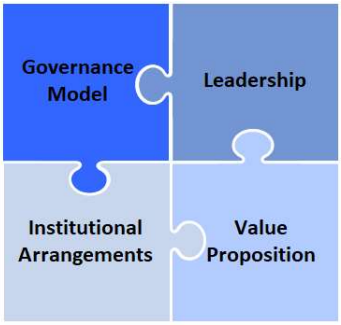
This level of geospatial capability can only be achieved through cooperative governance frameworks and with strong leadership that penetrates across sectors and through all levels of government. Institutions need to work together to share information and work towards common strategic priorities and goals.

By interconnecting government functions through well-functioning governance frameworks, it is possible to bring together geospatial information from multiple sources so that it can be used seamlessly on a computer, tablet and smartphone.

Good governance and cooperative institutional arrangements are the first priority in the geospatial information reform agenda. They enable geospatial information challenges to be met head on, provide flexibility to accommodate the rapidly changing environment, and the ability to embrace community and business participation within a culture of digital reform.

Common to all governance and institutional arrangements are four key elements that are required to build a cooperative data sharing environment and an appreciation of the value of geospatial information for decision-making.

The four elements are:



- **Governance Model** - based on a geospatial strategy for the nation and facilitated by governing bodies responsible for aligning and supporting policies and laws affecting the acquisition, creation, management, use, and dissemination of geospatial information.
- **Leadership** - to formulate and sustain a national geospatial information management strategy, develop a country-level action plan for implementing the IGIF, and create a governance process for assuring effective management responsibilities for the enterprise.
- **Institutional Arrangements** - that define roles and responsibilities across government for tasks associated with all aspects of geospatial information management, including appropriate coordination, management and oversight for meeting national priorities.
- **Value Proposition** - that measures, monitors, and communicates the economic benefit of integrated geospatial information to national priorities including citizen and societal benefits.

These elements are underpinned by principles that promote successful governance and institutional arrangements that can be adopted by each country. The principles are put into practice through several strategic actions that deliver and strengthen participation and commitment to achieving an Integrated Geospatial Information Framework. Tools, such as matrices, examples and checklists, are provided in the appendices to assist countries to work through concepts and processes to successfully complete each action. The overall structure for governance and institutional arrangements is illustrated in and anchored by Figure 1.1 below.

When implemented the actions (and their interrelated actions[1]) will enable the achievement of the four elements, which in turn will deliver significant and sustainable national outcomes and benefits for a country. These outcomes include attaining:

- Efficient planning and coordination of the government's geospatial information resources;
- Strengthened institutional mandates and political buy-in;
- A cooperative data sharing environment; and
- A shared understanding of the value of integrated geospatial information management.

[1] The interrelated actions across all Strategic Pathways are described in detail in Chapter X, the Index Chapter.

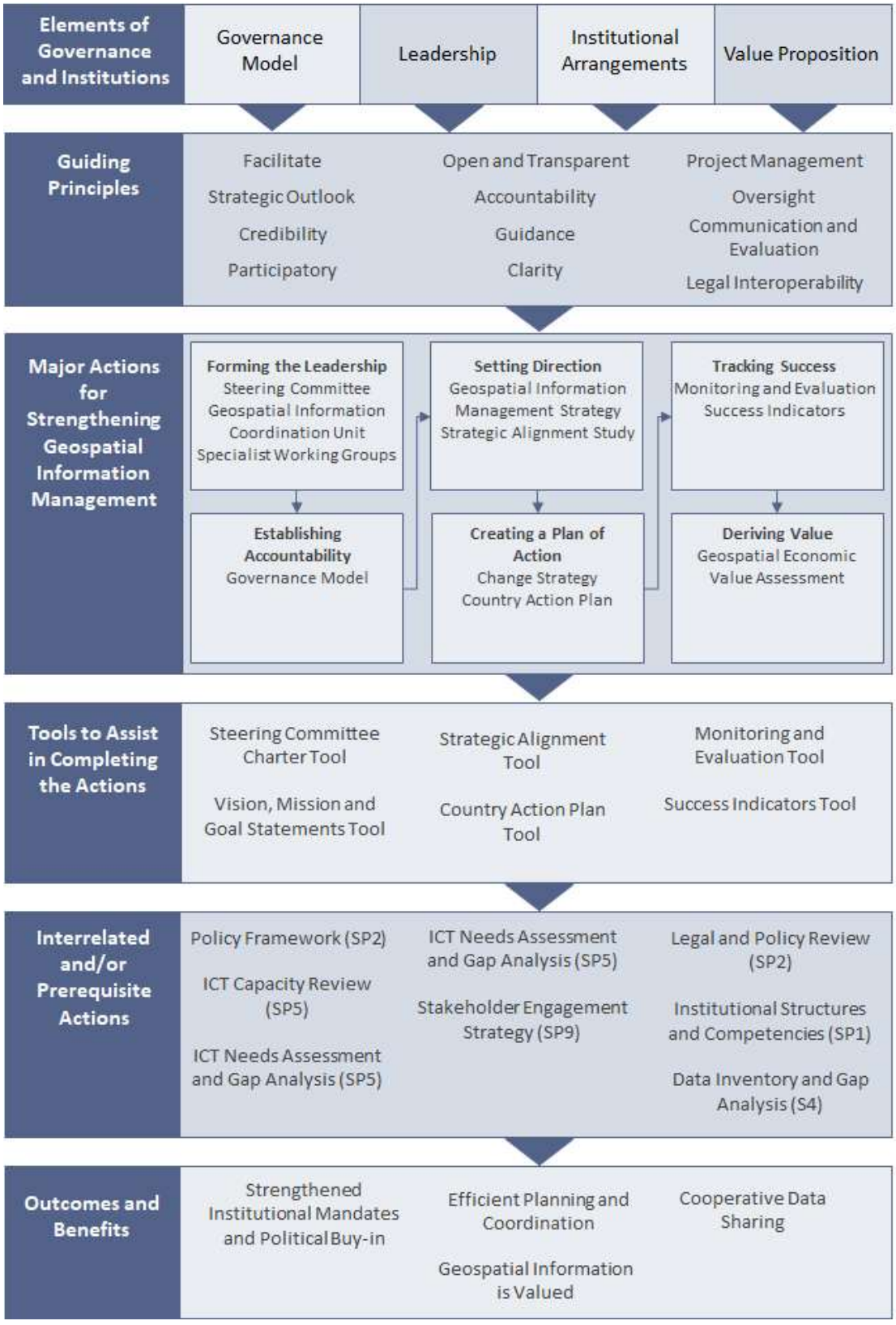


Figure 1.1 *The overall structure for governance and institutional arrangements - showing the four key elements, guiding principles, actions and interrelated actions, and the tools provided in the appendices to support the achievement of outcomes.*

1.1 Introduction

Governance and institutional arrangements present a clear division of roles and responsibilities among organizations involved in geospatial information management.

Governance and institutional arrangements for geospatial information management refers to the formal and informal structures of cooperation between and among organizations. These structures support and link institutions with other organizations (either public or private) to help fulfill their mandate. Organizational structures are formulated on policies, laws, systems, processes and productive frameworks that enable sustainable management of geospatial information (UN-GGIM, 2017).

With increased activity in the collection and management of information across the wider government sector, it is important to have a governance framework and institutional arrangements that support consistency, integration and usability.

Governance and institutional arrangements typically evolve over time and are unique to each country. Arrangements will depend on a broad range of conditions including the general institutional and legal framework within each country, governance traditions, and the political system.

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 recognize that although institutional arrangements are a key component of governance - wider governance responsibilities of authority, decision-making and accountability need to be clearly defined at all levels of government (national, provincial and local), and complimented by a legal and policy framework that is supportive of information access and reuse.

To maintain relevance, the legal and policy framework is periodically reviewed and enhanced as the geospatial information ecosystem advances – both in terms of technologies and applications.

A geospatial information program's success is improved with sound principles of project management at every level. Responsibilities on change management, risk management and mitigation, project schedules, budget and resource allocations, and monitoring and performance indicators collectively offer tools for successful outcomes.

Governance and institutional arrangements present a clear division of roles and responsibilities among organizations involved in geospatial information management. This includes the rules, operations, oversight and regulatory

conditions between institutions. Arrangements typically include mechanisms for collaboration across government sectors, and with non-public sector stakeholders, such as donors, private sector and non-government organizations; and can be extended to collaborative arrangements with community groups and individuals that are engaged in participatory data collection and mapping programs.

It may be necessary for some countries to develop new governance and institutional arrangement to transform and integrate geospatial information management practices across the broader government sector. However, there is no single universal governance framework and institutional arrangements that fit all countries. Nevertheless, successful approaches do have several common elements that have evolved from past experiences and lessons learned.

This strategic pathway discusses the importance of governance and institutional arrangements and identifies several activities that countries can adopt to bring about effective geospatial information coordination and leadership.

An important first step is to implement an advisory body or steering committee (or similar), to bring all stakeholders together to focus on preparing the governance framework, guidelines and managerial instruments to be used across government; and provide an environment for strategic thinking, planning and decision-making necessary to modernize geospatial information management practices.

1.2 Context and Rationale

National geospatial information management challenges faced by countries are typically shaped by existing governance and institutional arrangements. The most common challenges are related to a lack of organization and leadership. This often stems from weak links or communication gaps arising between the political/policy decision-making level and the more technically orientated geospatial community.

National geospatial information management challenges are typically shaped by existing governance and institutional arrangements.

Information silos often create further impediments and barriers to information sharing. There are typically a number of institutions responsible for the management of geospatial information based on their need and/or mission. The division of roles and responsibilities is usually domain-specific where urban, rural, forestry, cadastral, topographic, and statistical mapping and remote sensing is conducted by different organizations and institutions. There are often no, or very limited, policies or agreements in place to mandate and encourage coordination, data exchange, and no underlying organizational culture of sharing information.

These information silos may lead to the same datasets being created independently, causing data inconsistencies and ambiguity for end users and a duplicative financial overhead for government. The effects of duplication often hamper cooperation as ownership and dependency on data and services challenge what is best for the nation while promulgating different data standards and models that may arise to meet different business needs.

This is a problem for development projects. It is not always easy to determine if geospatial information exists and which organization has the responsibility and, as a consequence, information is often duplicated to meet short term project goals.

A more collaborative approach to governance and institutional arrangements is required. This is not always easy to enact. Mapping systems, data models and business processes are well entrenched within organizations and difficult to change – culturally and financially.

Nonetheless, the widespread adoption of digital technologies has made digital collaborations more conceivable. Therefore, geospatial data responsibilities today are increasingly involving multiple organizations working together to deliver geospatial data, products and services to market.

1.3 Approach

The way forward relies on understanding the value of geospatial information and having the leadership to drive change.

In this strategic pathway, the approach for attaining political endorsement, strengthening institutional mandates and building a cooperative data sharing environment is through a shared understanding of the value of the Integrated Geospatial Information Framework, and the roles and responsibilities to achieve the vision.

The approach includes four key elements that are a guide for nations to strengthen participation and commitment to achieving an Integrated Geospatial Information Framework. These elements include the implementation of a **governance model** to strengthen multi-disciplinary and multi-sectoral participation, effective and transformational **leadership,** supportive **institutional arrangements** and a clear **value proposition** that is appreciated broadly. These elements are explained in more detail below (See section 1.7).

The methodology includes strategic pathway actions that are recommended as a means to achieve the four key elements. The actions are underpinned by guiding principles and there are several interrelated actions detailed in other strategic pathways that may need to be completed to achieve the desired outcomes. Tools are available in the appendices. The Approach for Strategic Pathway 1: Governance and Institutions is illustrated in Figure 1.2 and explained in the following sections.

Figure 1.2 *The Approach to governance and institutional arrangements.*

1.4 Elements

1.4.1 Governance Model

A governance model is the operating structure that defines the way geospatial information responsibilities are assigned, coordinated, managed and monitored within and across institutions.

A governance model is the operating structure that defines the way geospatial information responsibilities are assigned, coordinated, managed and monitored within and across institutions. It provides the policies, guidelines and measures to effectively collect, manage, share, curate and leverage geospatial information.

The governance model directs the level of geospatial information coordination across government – ideally with all levels of government through partnerships (local, national, regional and global). It reflects the interrelated relationships and operational dynamics that influence the management of geospatial information.

The governance model is essential to achieving government objectives, driving improvement and maintaining a legal and ethical standing in the eyes of stakeholders, partners, regulators and the wider community. It helps to assure that the geospatial data needed for a nation's current operations and future planning are considered along with the technology and standards that are required to make that possible.

The model adopted should meet key accountability and outcome provisions of individual government departments as well as balancing the need for effective collaboration across institutions to achieve the best outcome from a whole-of-government perspective.

1.4.2 Leadership

Leadership is realized through the implementation of a national strategy.

Leadership is realized through action on the implementation of a national geospatial strategy that clearly describes the country's strategic priorities through the use of geospatial information. Leadership is about having a vision and knowing the tactics to achieve the vision.

The geospatial strategy answers the question – Where are we going? It paints a picture of a future where the implementation of the Integrated Geospatial Information Framework is realizing significant benefits to the country. Having this picture builds momentum among stakeholders and partners to take action and achieve results.

A "champion" (in government) is typically identified to actively lead, engage and promote the strengthening of geospatial information management across government organizations (at a local, national and global level), and with the private sector, academia, and local community.

1.4.3 Institutional Arrangements

Institutional arrangements lay the foundation for effective geospatial information management.

Institutional arrangements lay the foundation for effective geospatial information management, from the identification of data sources to the dissemination of outputs, and for promoting communication between the staff of the different institutions involved.

Institutional arrangements include the roles and responsibilities of organizations in geospatial information management, and the operating relationship between organizations - producers, administrators and/or users of geospatial information.

Institutions need to be adequately enabled and mandated to acquire, administer, manage and deliver operations associated with geospatial information and decision-making over the longer term. Policies and legal mechanisms strengthen institutional arrangements.

1.4.4 Value Proposition

The geospatial information value proposition is key to achieving political support.

There are many benefits that geospatial information delivers to the responsibilities and activities of government - the benefits of which, are ultimately realized by the community. However, the value proposition is not always clear.

The value proposition is part of the geospatial strategy. It is a statement of what makes geospatial information important and necessary to the responsibilities and activities of government. Understanding and communicating the value proposition, in a country's specific context, is key to achieving political and management buy-in with financial support.

A value assessment is required to make the case by demonstrating why geospatial information is a necessary government asset. The value assessment is a critical input to the geospatial strategy, financial investment process and business model.

Interrelated Actions:

SP1 Geospatial Information Strategy (1.6.x)

SP2 Business Model (2.6.x)

1.5 Principles

By applying these principles, countries can progress in strengthening geospatial information management.

There are specific principles and elements common for successful governance and institutional arrangements that can be adopted by each country. Replicating a successful institutional model from one nation to another likely will not work in its entirety as there are different priorities and levels of development maturity and cultural aspects that need to be taken into account. That said, using good ideas and successful implementations across nations is encouraged where the approach is suitable. The guiding principles are:

- **Facilitate**: Provide a forum for the effective management and sharing of spatial information across the government, private, academic and community sectors.
- **Strategic Outlook:** A governance approach that focuses on strategic national imperatives and goals, as well as, institutional requirements.
- **Creditability**: A governance model that is easily accessible and credible to participating institutions and broader stakeholders.
- **Participatory:** A governance model that is inclusive of all stakeholders and embraces an inter-disciplinary and cross-sector participatory approach.
- **Open and Transparent:** Open and transparent communication that fosters a culture of cooperation, participation, accountability and innovation
- **Accountability:** The responsibility for the decisions and laws that affect the strengthening of geospatial information management rests with government and is responsive to stakeholders' needs and is in the interests of the community.
- **Guidance**: A model that is driven from the top, so that participating institutions are well supported, encouraged and guided in their daily tasks and decisions.
- **Clarity:** Clear delegated levels of authority, and roles and responsibilities for implementing and maintaining the Integrated Geospatial Information Framework.
- **Project Management**: Sound principles of project management applied at every level clearly indicating responsibilities and expectations for assuring project success for the Integrated Geospatial Information Framework program.
- **Oversight:** Review of existing and proposed geospatial information programs to assure that goals and objectives are progressing or have

been accomplished and to inform and learn about conditions and circumstances that impact realization of the outcomes.

- **Communication and Evaluation:** Regular cross-sector and cross-committee announcements, program updates, reporting and monitoring, complemented by re-evaluation of performance expectations and adjustments where necessary.
- **Legal Interoperability:** Institutional arrangements and mandates that are interlinked with the policies and laws that enable and promote geospatial information sharing and use.

1.6 Actions

The following strategic pathway actions are recommended as a way to achieve the four key elements. Some actions have interrelated actions that need to be achieved prior to, or in conjunction with, the strategic pathway actions. These interrelated actions are referenced in the text and detailed under other strategic pathways.

Country-specific needs may be influenced by factors such as country priorities, existing capabilities, resources, culture and other practicalities. These will influence approaches for implementing each strategic pathway.

Whatever the implementation approach, each action should take into account the guiding principles above as these describe drivers for effective and efficient geospatial information management.

The strategic pathway Actions are divided into six categories that reflect the order in which the actions are typically completed. A road map illustrating this order and where the Actions typically occur is presented in Figure 1.3 and detailed more with interrelated actions in Figure 1.4. The categories of Actions are:

1. Forming the Leadership
2. Establishing Accountability
3. Setting Direction
4. Creating a Plan of Action
5. Tracking Success
6. Deriving Value

The following Actions are typically used to address gaps in capability. They serve as a guide to building the necessary capacity to strengthen integrated geospatial information management processes and systems.

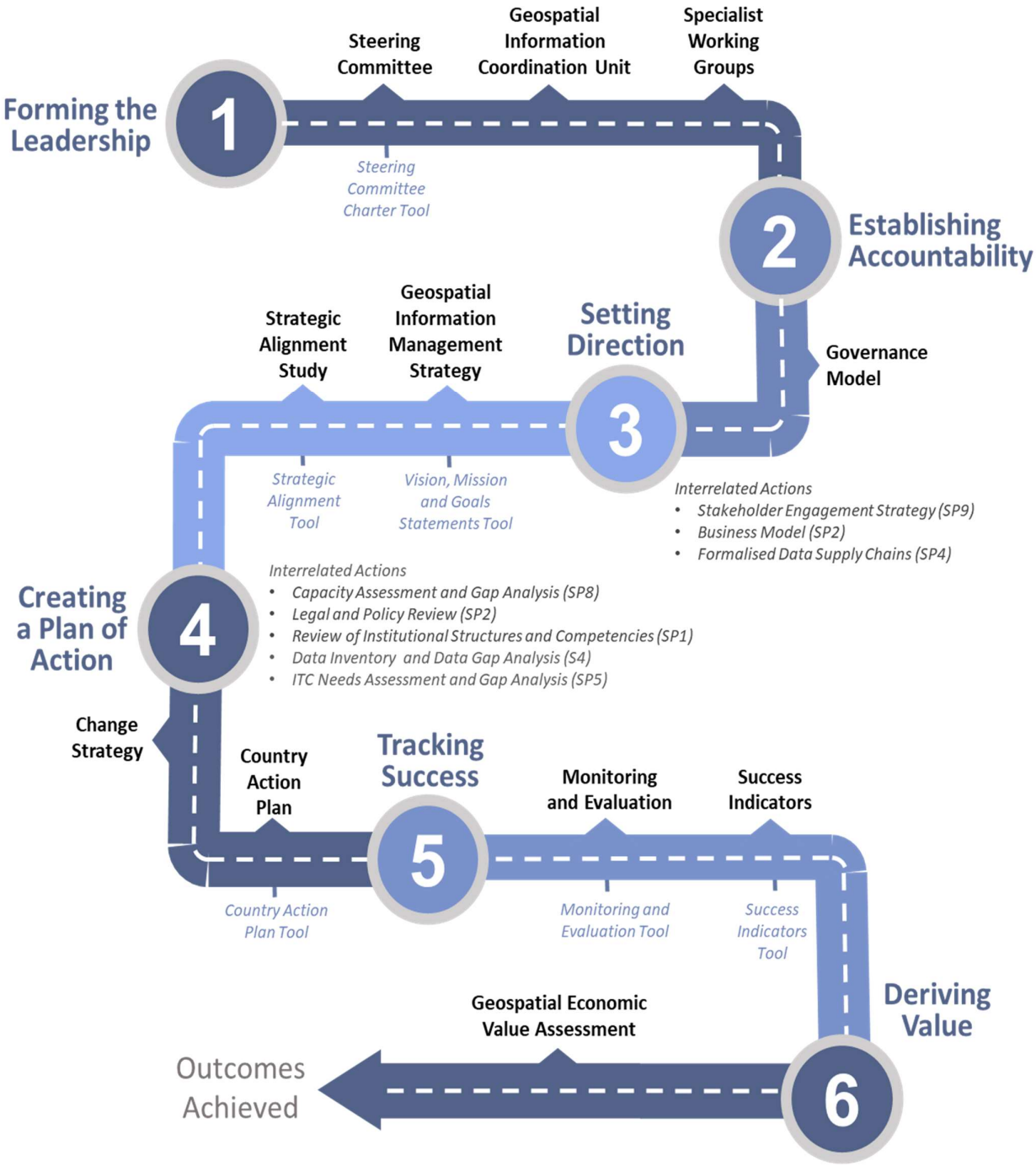


Figure 1.3: Governance and institutional arrangements includes several actions and tools designed to assist countries to achieve political endorsement and strengthened institutional mandates for building a cooperative data sharing environment. The actions are divided into six categories and reflect the order with which these actions are typically completed.

Figure 1.4: *Governance and institutional arrangements includes several actions and tools designed to assist countries to achieve political endorsement and strengthened institutional mandates for building a cooperative data sharing environment. The interrelated actions provide key linkages to other strategic pathway actions.*

1.6.1 Appoint a Steering Committee

A Steering Committee will provide the leadership and direction for implementing the Integrated Geospatial Information Framework.

A Steering Committee (or equivalent governing body) is typically established to provide the necessary leadership and direction for implementing the Integrated Geospatial Information Framework.

The Steering Committee is generally made up of members from across government. This structure recognizes that organizations, which collect, manage and are significant users of geospatial information, and have a significant role to play in strengthening geospatial information management.

The Steering Committee Chair acts as the spokesperson of the committee and ensures that an appropriate level of dialogue occurs between institutions.

The Steering Committee requires a Terms of Reference, roles and responsibilities and code of conduct.

A Steering Committee Charter for Geospatial Information Management is used to define the Committee's mission, authority and responsibilities, composition, how and when meetings will be held, communicating meeting details and Committee actions, and how meeting minutes will be written and approved.

The Charter will also incorporate the committee's purpose, goals and objectives, and may:

- include agency responsibilities for each fundamental geospatial data asset (theme) for collecting, maintaining, and assuring data coverage, quality and completeness;
- provide strategic direction and endorse overall policy and strategic plans for sharing geospatial information;
- deliver whole of government strategic outcomes through the Coordination Unit (see 1.6.3) work plan and the implementation of operational strategies within Member Organizations;
- coordinate access to geospatial information held by government departments and facilitate cross-sector consultation and liaison;
- ensure capabilities are planned and implemented for integrating geospatial information across government; and
- foster innovation, provide leadership and coordination, and promote standards necessary to strengthen geospatial information management.


An example of a Steering Committee Charter is provided in Appendix 1.1

1.6.2 Establish a Geospatial Information Coordination Unit

A Geospatial Information Coordination Unit (or Office) is often established to coordinate and be accountable for all Integrated Geospatial Information Framework related activities.

A Geospatial Information Coordination Unit is an independent body representing whole-of-government needs.

Importantly, the coordination unit is 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 coordination 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 have political support.

The Geospatial Information Coordination Unit is typically 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, and with a mix of data producers and users. This arrangement should be inclusive of community mapping groups and the private sector, where appropriate.
- 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 emergent capabilities.

Fiji Geospatial Information Council

Fiji has established a 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.

The Council is not only confined to government ministries, but also includes Heads or Representatives of entities in the Private Sectors that are directly or indirectly involved in geospatial information management and remote sensing technology.

The Council promotes and allows the sharing of key datasets for decision-making under five 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

Strengthening the human technical capacity of the industry.

To be completed after KL Meeting

1.6.3 Establish Specialist Working Groups

Working groups, advise the coordination unit and Steering Committee on specialist matters.

Specialist working groups (or subcommittees), comprising subject matter experts, are required 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 themes for working groups 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. In addition, if there is an intent for a national geospatial portal and/or website for users to access any and all geospatial data for the country, a technical working group assumes the coordination of that effort.
- **Data:** Provides advice on the management, integration, 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.
- **Capacity and Education:** Provides oversight and directs initiatives aimed at raising awareness and building the skills and knowledge necessary for strengthening geospatial information management.
- **Legal and 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.
- **UN-GGIM:** Coordinates review of UN documents related to global, regional, national, and local geospatial topics. Coordinates preparation for the annual session of the UN-GGIM. Assures participation on the UN Expert and Working Groups and Subcommittees associated with geospatial responsibilities.

- **Users:** Coordinates between the geospatial user community and the government agencies responsible for collecting, managing, integrating, and disseminating geospatial information. Develops strategies for effective engagement with the user community. Encourages comments, feedback and reviews on topics of geospatial data availability, quality, usability, currency, and coverage.
- **Boundaries:** Assures development of nationally consistent boundaries for each fundamental data theme as appropriate that are integrated to a common geographic base. Promotes the use of geospatial standards in the delineation, collection, and management of boundaries. Provides guidance on the creation and management of boundary metadata.

It is also important to establish a Communication and Engagement Steering Group to direct, evaluate and make recommendations on the stakeholder communication and engagement processes over the longer term (See SP9: 9.6.1).

The interrelationship between the Steering Committee, Geospatial Coordination Unit, working groups, and the Communication and Engagement Steering Group are shown in Figure 1.4.

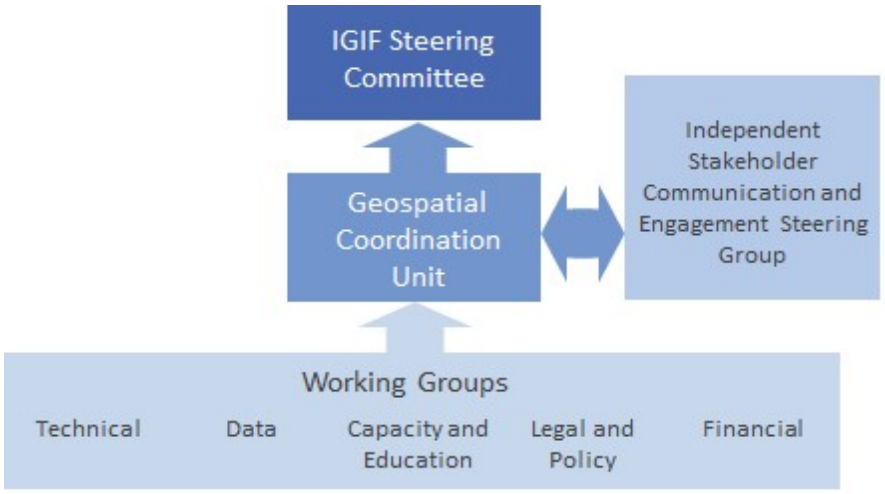


Figure 1.4 *Interrelationships between the Steering Committee, Geospatial Coordination Unit, the working group, and the Communication and Engagement steering Group*

1.6.4 Develop a Governance Model

The Governance Model is a diagram showing the interrelationships between the proposed institutions, committees and the Geospatial Information Coordinating Unit. The Governance Model is designed to bring national and municipal agencies together to share geospatial information, reform cross-agency business processes and adopt data standards and interoperable systems.

Ideally, the model should build on and encourage 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:

- Addressing national geospatial needs and priorities while ensuring that sufficient investments are planned;
- 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 reference to the IGIF;
- 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;
- Providing a mechanism for civic and user engagements to assure that user expectations are heard and considered;
- Developing institutional organizational models and regulations for effective management and sharing of spatial information across sectors.

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

1.6.5 Develop a Geospatial Information Management Strategy

The geospatial information strategy identifies the vision, mission, goals and objectives of the geospatial information management initiative.

The geospatial information strategy is an important first step towards identifying the vision, mission, goals 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.

Information on how to create a vision and mission statement, and strategic goals is provided in Appendix 1.2.

The strategy development process 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 (See SP9: Communication and Engagement).

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

The strategy should connect to other broader strategic and policy objectives of government (Environmental Policies, Financial Policies, Health Policies, etc.) in order to provide direction on where to focus and apply most effort (See Section 1.6.6).

1.6.6 Conduct a Strategic Alignment Study

A Strategic Alignment Study assists countries to align geospatial information management activities to what matters most.

Integrated geospatial information management is a strategic enabler. It enables improved planning for economic growth and delivery of better services, and supports the delivery of the SDGs, such as strategies for poverty alleviation, engenders socially inclusive development, facilitates protection of the environment, reduces disaster response times, supports regional cooperation and promotes transparency in governance.

A periodic Strategic Alignment Study assists countries to align geospatial information management activities to what matters most. The Strategic alignment study results in the linking of integrated geospatial information needs and resources with the priorities of government (economic development, SDGs, regulatory, public safety and emergency response, etc.). It essentially defines a portfolio of geospatial information management activities, projects and

programs that will deliver a country's strategic priorities. Institutional mandates can be harmonized in line with higher level government priorities and initiatives.

Strategic alignment enables improved performance of integrated geospatial information management activities, by optimizing the contributions of organizations (people, processes, and inputs) in a way that minimizes waste and misdirection of effort and resources.

Examples of how integrated geospatial information management is a strategic enabler are provided below:

- **Economic Growth:** Managing the orderly development of land, and subsequent provision of a multitude of government and private services through infrastructure development, requires integrated planning. This is fundamental to a vibrant economy and community. Planning is underpinned by a good understanding of where things are and how they relate to each other. Business development, investment and donor opportunities, and providing and maintaining basic citizen services fairly distributed across areas of the country are examples of economic benefits to a nation. Geospatial data supports the range of services and infrastructure including roads, rail, ports, utilities, and community services such as education, health, welfare and justice. Providing whole-of-government geographically-referenced integrated data allows for optimal planning of infrastructure and services to meet future needs.
- **Socially Inclusive Development:** Government's ability to understand and recognize the geographic distribution and demographics of people throughout the country, and respond effectively to their needs, is dependent on having sound information on which to base planning and decision-making. This information comes from a wide variety of sources and can be very limiting without a geographic context. Integrated geospatial information management enables the integration of statistical data in a geographic context. This allows effective development of government policies and the planning of government infrastructure and services for regionally balanced decision-making.
- **Poverty Alleviation and Improved Health Services:** In many countries, the Government is targeting poverty reduction programs, and supporting special projects, such as health care, waste management and drinkable water. These efforts directly benefit the communities by improving their basic survival needs and establishes socio-economic status. Geospatial information supports these project objectives by making planning and program implementation far more effective. This in turn assists in the effective delivery of critically important basic human need programs.

- **Protection of the Environment:** Many countries face a host of environmental problems such as land degradation, pollution and poor management of water resources, loss of biological diversity, coastal erosion, increasing scarcity of water for agriculture, waste disposal in urban areas, and traffic congestion in the main cities. The challenge is to balance increased development with sustainable environments. Management of natural resources, particularly with increased pressures resulting from changes on the planet, requires accurate geospatial information to understand and manage and monitor the many competing factors in the environment. In many cases, the various government agencies have their specific areas of responsibility and each retains specific geographically-related information to support that responsibility. Conversely, each needs to access data from other agencies in establishing their own natural resource management plans. Being able to share integrated geospatial information management through improved technology and methods and a coordinated Integrated Geospatial Information Framework will allow better-informed natural resource management decisions. This is essential as economic growth may result in unsustainable use of natural resources and unintended environmental implications for local habitats.

- **Water Resource Management:** A number of governments have a key priority to improve the accessibility of clean water supply and sanitation. To adequately serve their growing populations, agriculture in arid and semi-arid regions require disciplined water resource management. Achievement of these goals will require an excellent foundation of spatial information. In many situations, geospatial information on water resources is maintained within several organizations with specific responsibilities such as those responsible for Irrigation and Water Resources Management, Land and Land Development and Water Supply and Drainage. The ability to share geospatial information management transparently across agencies means that agencies can focus on their core tasks rather than diverting resources into searching for, and retrieving, data.

- **Disaster Response**: Planning, mitigating, responding to, and recovering from natural disasters, is crucial to providing safe and secure communities. Geospatial information is critical in these processes. In terms of mitigation, geospatial information contributes to the placement of early warning systems as a preventative measure prior to a pending disaster event. Knowing where vulnerable populations and critical infrastructure are located in preparation for impending natural events allows for more informed preventative actions. Improved information sharing technologies will provide a common operating

picture and up-to-date information that can be shared across the spectrum of agencies that are managing the environment and dealing with emergency situations. In emergency management terms, being able to share integrated geospatial information in real-time means the 'same Information will be delivered to all agencies at the same time'. Geospatial information is also critical in responding to the aftermath of disasters. What happens next and where actions are needed are made possible by up-to-date geospatial information.

- **Business and Industry development:** Integrated geospatial information supports planning requirements for increasing industrial development and the growing demand for new infrastructure. In many countries, industrial activities are increasing that oftentimes provide higher-paid employment in industry and related manufacturing services. Locating where a manufacturing plant is best placed depends on several factors, many of which are determined by geospatial information such as road, rail, and port locations, proximity to populated areas to provide workers, and desirable places to live for families of workers. Many of these jobs will be in urban areas and this suggests an accelerating rural–urban transition. Achieving employment growth, while ameliorating potential adverse social and environmental impacts of urbanization will be a key development challenge for countries. Geospatial information provides context to analyzing these types of complex situations.
- **Agricultural productivity:** In some countries, small-scale farming has declined over the past decades due to irregular rainfall, recurrent drought and poor irrigation infrastructure. Food security in terms of availability, accessibility and affordability is uncertain, most notably in rural regions. Integrated geospatial information can be analyzed by government to assist smaller farm holders through yield monitoring and crop stress mapping, variable rate technologies (for applying fertilizers and irrigation), soil condition mapping and salinity mapping, and the control of pests and disease outbreaks. In the longer term this will lead to achieving a higher productivity and profitability in agriculture.
- **National security:** Defense and intelligence agencies normally function in their own domain, including their collection, management, and use of geospatial information. Over time, some nations include representatives from defense and intelligence communities as part of the geospatial governance process to better serve the public safety and security interests within a country. Knowledge of civilian assets can sometimes help to more effectively deal with special events and circumstances. At the same time, geospatial assets from the defense and intelligence communities that are not sensitive or classified can help

civilian agencies leverage the national investments made for wider use and benefit for the country.

The first step in a Strategic Alignment Study s to identify the country's strategic priorities. This involves listing the strategic drivers that will benefit from having strengthened geospatial information management, determining what activities are required to facilitate transformational change, and prioritizing effort. The results from this study are typically included in the Geospatial Information Management Strategy (See Section 1.6.5).

A template for conducting a Strategic Alignment Study is provided in Appendix 1.3

1.6.7 Develop a Change Strategy

The Change Strategy identifies how the government will change current geospatial information management practices.

Once the Geospatial Strategy is complete, a Change Strategy is conducted to identify activities that need to be included in the Country Action Plan (See section1.6.8).

The Change Strategy identifies how the government will change current geospatial information management practices by addressing such things as creating or enhancing existing data assets, implementing new governance structures and institutional arrangements, streamlining the data supply chains, adopting new technologies and methods, developing a supporting legal and policy framework, and building human capacity.

As part of the development of the Change Strategy the following tasks are undertaken. The output of these tasks informs the Change Strategy and subsequently the Country Action Plan. The tasks are:

- A **Data Inventory and Gap Analysis** based on strategic needs and priorities (See SP4: Activities 4.6.2 and 4.6.4).
- An **Institution Culture Assessment and Gap Analysis** to gauge whether stakeholders understand the reasons for the Integrated Geospatial Information Framework, and whether they view the framework as potentially beneficial and are in support of the changes required. It will then be possible to determine what cultural changes may be required to implement Integrated Geospatial Information Framework. This activity forms part of the Stakeholder Communication and Engagement Strategy (See SP9: Activities 9.6.3 and 9.6.4).

- 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 (See SP4: Activity 4.6.15).
- A **Technology Assessment and Gap Analysis** 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 (See SP5: Activities 5.6.2 and 5.6.3).
- A **Legal and Policy Review and Gap Analysis** to better understand the legal and policy changes necessary to implementing integrated geospatial information management and access (See SP:2 Activity 2.6.x).
- A **Capacity Assessment and Gap Analysis** to identify where skills fall short of requirements. Gaps in training and knowledge exchange among stakeholders are identified early to inform the Change Strategy (and will also inform the capacity building plan (See SP8: Activity 8.6.1 to 8.6.4)

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 IGIF benefits and opportunities and to ensure these benefits are communicated to decision-makers and stakeholders more broadly.

In summary, the Change Strategy clearly outlines 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

1.6.8 Develop Country Action Plan

Country Action Plan describes how the government will meets its goals and objectives.

The Country Action Plan describes how the government will meets its goals and objectives through detailed activities that describe how and when these activities will be undertaken and by whom.

The Country Action Plan is typically spread across appropriate horizon periods (e.g. 1-3 years, 3-5 years, 5+ years as relevant). Delivering integrated geospatial information is likely to be a complex and time-consuming exercise and therefore the road map should be designed to grow capability over time. While there is no specific order required, a sequence of actions helps to plan for subsequent dependent activities. The Country Action Plan typically includes the following for each activity identified:

- **Agencies involved:** Identifies stakeholders with interest or responsibilities for activities.
- **Contact Person:** To be contacted for more information on the activity/s.
- **Background and Rationale:** Information for the reader of the Action Plan so that they understand why the activities have been identified. This includes a brief statement on the current situation and gaps in capabilities.
- **Proposed Framework:** This section provides a broad overview of how each activity in a strategic pathway interrelates. A diagram is recommended to assist in understanding the broader framework in which the activities are contained, such as a Governance and Institutions Framework, Legal and Policy Framework, Financial Framework and Data Framework etc.
- **Objectives**: These are the objectives of delivering the approach (Strategic Pathway). They are important to include in the Country Action plan as they can be incorporated in future business cases or when seeking approvals, such as for a new governance body or for justifying funding, as they explain the rationale for undertaking the activity.
- **Activities**: This section lists the activities and their subtasks within each activity. These activities can then be incorporated into a Gantt chart to aid in managing each task. Activities may be determined through the Country Needs Assessment and Gap Analysis. The Integrated Geospatial Information Framework Part 2: Implementation Guide may be used as a reference to determine what activities can be implemented to address gaps in current capabilities.
- **Implementation Timeframe:** This section includes a Gantt chart (also referred to as a schedule) that includes activity timeframes, and the interdependencies between activities and tasks within and across strategic pathways. It is a visualization (bar chart) of the Action Plan Activities and includes the start and end date of each activity. This information can be used to assign specific tasks to meet the activity which helps in resource management. Any changes to the timeframe would go through a change control approval process to aid in managing the overall program. The results of any changes help to plan for future activities as more experience is gained.
- **Deliverables**: These are the products/systems/reports that are expected to be delivered as a consequence of completing the activities. Dependency on completion of one activity may be a predecessor to the beginning of a new activity. The Gantt chart or other workflow diagram helps in visualizing the relationships, flow, and dependencies of activities.

- **Outcomes:** This section identifies the things that change because an activity has been completed i.e. the real or tangible differences that are being made towards strengthening integrated geospatial information management, and as a consequence, progress towards achieving on the SDGs. The outcomes may be written as benefits. This information can be shared with stakeholders and any oversight to indicate the value proposition of the outcome.
- **Risk & Mitigation:** With any action plan there is a risk of not being able to complete activities. This section identifies the risks, their likelihood and severity, and the risk mitigation strategy that needs to be put in place. In some cases, risks are external and may not be under the control of the organization. In those cases, it is important to communicate potential impacts of risk to the activity and program. Proactive steps should be taken to avoid risks to the activity and program.
- **Budget Estimation**: This section identifies the budget required for each activity. A budget includes sources of funding or income, planned expenses that include resource/people costs and other expenses. Labor is normally one of the highest costs for a program as most geospatial activities require staff to conduct the work. Other expenses could include such items as IT procurement and/or maintenance, IT services, travel, building/equipment rental, training and so forth.
- **Funding Status:** This section identifies the funding sources, or the approach being used to seek funding or in-kind support, such as potential partnerships. Examples of funding include allocation from central government, financial partnership with other government agencies, and donor programs from other countries and/or NGOs. While services-in-kind are normally not a funding source, they do offer a financial benefit to the organization. Some countries also include funds from sale of geospatial products. Oftentimes, these estimates are greater than the amounts realized through sales.
- **Monitoring and Evaluation:** This section identifies the success indicators, reporting mechanism (e.g. traffic light reporting method), evidence of achievement etc.). Monitoring and evaluation require discipline to periodically check the status of the program. Monitoring also includes establishing a culture of open dialogue when something goes amiss from the planned set of activities. Knowing problems occur as soon as possible helps in controlling the impact and provides more time to propose options for mitigating the problem.

A Country Action Plan Template is provided in Appendix 1.4.

1.6.9 Develop a Monitoring and Evaluation Framework

The Monitoring and Evaluation Framework monitors achievements towards attaining strategic goals.

The Monitoring and Evaluation Framework ensures regular monitoring of achievements towards attaining a country's strategic geospatial information management goals. The Monitoring and Evaluation 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

Success indicators are used to monitor and evaluate progress towards strengthening integrated geospatial information management. Success can be gauged by measuring progress towards achieving the objectives for each Strategic Pathway or the objectives identified in the Geospatial Information Management Strategy.

Achievement of objectives indicates you are on the right path towards achieving your strategic goals. If an objective is not met, corrective action may be required. It is worthwhile documenting contributing factors and extenuating circumstances that may justify either leaving the objective as-is or changing it.

A Monitoring and Evaluation Template is provided in Appendix 1.5.

1.6.10 Geospatial Economic Value Assessment

The Geospatial Economic Value Assessment provides a valuation of geospatial information in economic terms.

The Geospatial Economic Value Assessment enumerates the potential costs of implementing the IGIF, the value of the anticipated benefits derived from strengthening geospatial information management, and the trade-offs inherent in alternatives.

The assessment provides 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 will 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, 2004[2]).

1.7 Deliverables

The list of deliverables below is an example of actions that can be monitored to improve success factors in realizing an Integrated Geospatial Information Framework. Examples include:

- A Steering Committee and agreed Steering Committee Charter
- A Geospatial Information Coordination Unit appropriately staffed and with delegated powers, roles and responsibilities, and funding and computing resources
- Fully functioning Working Groups (or subcommittees) with specific Terms of Reference
- 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 including a schedule of activities
- Geospatial Economic Value Assessment
- Monitoring and Evaluation Framework for effective multi-stakeholder monitoring of activities under the Action Plan Road Map.

[2] *WHO (2004) Economic Assessment available at http://www.who.int/heli/economics/en/*

1.8 Outcomes

The following outcomes result from establishing the leadership, governance model, and institutional arrangements and a clear value proposition for integrated geospatial information management:

- Efficient planning and coordination of the government's geospatial information resources
- Strengthened institutional mandates and political buy-in
- A cooperative data sharing environment
- A shared understanding of the value of integrated geospatial information management

1.9 Resources

At the 7th session of the Committee of Experts, the UNGGIM Working Group on Trends in National Institutional Arrangements presented a series of deliverables that will support countries in developing their governance structure and institutional arrangements for geospatial information management. They are:

- a set of recommendations for implementing national institutional arrangements[3];
- a methodology and approaches employed to prepare the national institutional arrangements framework, including instruments, principles and guidelines[4];
- a compendium of good practices for national institutional arrangements[5].

[3] Chapter III in 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%20NIA%20Instruments,%20Principles%20and%20Guidelines.pdf

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