INTEGRATED GEOSPATIAL INFORMATION FRAMEWORK

[Template]

Action Plan

World Bank Implementation Methodology

WORLD BANK GROUP
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Credits

This template has been prepared by the World Bank Urban, Disaster Risk Management, Resilience and Land Global Practice' (GPURL), Land and Geospatial Team, and supported by the Korea Green Growth Trust Fund.

The World Bank team was led by Kathrine Kelm, Senior Land Administration Specialist, Land and Geospatial Team, and included Andrew Coote, Dr Lesley Arnold and Dr Robin McLaren.

The concepts for the methodology are based on the Integrated Geospatial Information Framework (IGIF), which was adopted by the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM), August 2018.

The World Bank Methodology was developed in conjunction with the Food and Agriculture Organization of the United Nations.

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Instructions

This template is designed to be used to develop a Country Action Plan for strengthening geospatial information management. The Action Plan can relate to an entire country (National Spatial Data Infrastructure (NSDI)) or a region or city within the country (Spatial Data Infrastructure (SDI)). This document uses the term NSDI, but SDI can be substituted as appropriate.

The Country Action Plan is the culmination of the work undertaken using the World Bank IGIF Implementation Methodology to:

- *analyze a country's current situation (World Bank Diagnostic Tool and Baseline Report);*
- *understand geospatial policy and strategic drivers (World Bank Geospatial Strategic Alignment to Policy Drivers Study); and*
- *the socio-economic value derived from strengthening and using geospatial information and related technologies (World Bank Socio-economic Impact Assessment).*

This document provides headings, instructions, standard content, and examples that are recommended for Country Actions Plans:

- *[Template] – On cover page to be overwritten with Country name*
- *Country Logo - Add to cover page*
- *[Country] – Bracketed text is to be overwritten*
- *Headings – are included to assist in structuring the content and shaping the report.*
- *Instructions – are shown in purple italics and are to be deleted once understood.*
- *Standard Content – is content, shown in black text, which is to be retained/included in each Country Action Plan.*
- *Examples – are shown in grey as a guide to the content of each section and are to be overwritten with new material or removed as required.*
- *Remember to update the Table of Contents page numbers and Figure and Table caption numbering and references.*
- *Also update the Abbreviations to those relevant to this document.*

This section can be deleted in its entirety once the instructions are understood.

Status

This version of the template is final. It has been prepared by the World Bank following the publication of Integrated Geospatial Information Framework (IGIF) Part 2 in August 2020.

Add short statement to indicate clearly to the reader its status e.g., internal, draft, final. Check if a disclaimer is also required.

Report: Version history			
Version	**Date**	**Author(s)**	**Remarks**

Report: Review history			
Version	**Date**	**Reviewer**	**Remarks**

ABBREVIATIONS

The table below should provide common abbreviations. It should be updated to reflect what is relevant for each country and circumstance. All other abbreviations should be spelt out in full in the text on their first usage.

API	Application Programming Interface
BCA	Benefit-Cost Ratio
CBA	Cost-Benefit Analysis
CORS	Continuously Operating Reference Station
CPF	World Bank Country Partnership Framework
DT	Diagnostic Tool
GDP	Gross Domestic Product
GIS	Geographic Information System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
ICT	Information and Communication Technology
IGIF	Integrated Geospatial Information Framework
ISO	International Standards Organization
KPI	Key Performance Indicator
NMA	National Mapping Authority
NPV	Net Present Value
NSDI	National Spatial Data Infrastructure
NSO	National Statistical Office
ROI	Return on Investment
SDG	Sustainable Development Goal(s)
SDI	Spatial Data Infrastructure
TA	Technical Assistance

ToR	Terms of Reference
UN-GGIM	United Nations Global Geospatial Information Management
WB	World Bank

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This report was prepared at the requested of *[Name of Commissioning Agency]*.

The team was led by *[name of team leader]* and included [*names of team members]*.

The team is grateful to the *[title of head of commissioning agency]*, for their direction and hospitality and for putting together a support team which helped in organizing stakeholder meetings and collecting and collating data at both sector and higher-level government institutions.

The team also expresses their sincere gratitude to the wide range of stakeholders from different Ministries and Agencies, private sector organizations and Non-Government Organizations (NGOs) who gave valuable insights, information and time.

A full list of the parties engaged in the production of this report is included as Appendix A.

PREFACE

This is a common introduction to all templates within the IGIF World Bank methodology. Please check for updates prior to publication.

The world is experiencing a fourth industrial revolution built upon the internet and a comprehensive data infrastructure of fundamental datasets[1]. The term infrastructure is used here in the same sense as the road network is part of the fundamental infrastructure required to support transportation.

To help achieve this transition, many countries are building national data infrastructures. For instance, the Netherlands has been at the forefront of recognizing that integrating authoritative key data registers, such as buildings, addresses and ownership, into a coherent data infrastructure will, not only make Government more cost-effective, but will also make the interaction for citizens and businesses with Government quicker and more efficient[2] and allow the private sector to derive benefits from new services.

One of the primary components of a data infrastructure is the location of a nation's assets, including land, natural resources and the built environment to allow these assets to be managed more effectively in the context of development planning and climate change mitigation, for example. This is because "everything happens somewhere" and without knowledge of location (geospatial position[3]), decision making on many matters of national importance is significantly impaired.

The term Spatial Data Infrastructure (SDI) has historically focused on the collection of data and the implementation of technologies. The IGIF provides guidance on how to extend the scope of SDI to cover the governance, policy, financial, capacity and engagement processes necessary to collect, maintain, integrate and share geospatial information, through all levels of government and society.

In August 2020, the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) adopted the Integrated Geospatial Information Framework (IGIF), which provides the strategic guidance that enables sub-national or national-specific Action Plans to be prepared and implemented to strengthen integrated information management.

The IGIF aims to assist countries (including city and regional governments) to move towards e-economies, e-services and e-commerce. Delivering socio-economic value by improving services to citizens, enhancing evidence-based government decision making processes, creating new job opportunities, facilitating private sector economic growth and taking practical actions to achieve a digital transformation. Through these means, the IGIF will help

[1] United Nations GGIM Fundamental Geospatial Data Themes: https://ggim.un.org/documents/E-C20-2018-7-Add_1-Global-fundamental-geospatial-data-themes.pdf

[2] https://business.gov.nl/regulation/addresses-and-buildings-key-geo-register/

[3] These terms are used in different geographies and contexts and are regarded here as interchangeable.

to bridge the geospatial digital divide between developed and developing countries and to support the 2030 Agenda for Sustainable Development.

IGIF Structure

The IGIF comprises of three (3) parts as separate, but connected, documents:

- **Part 1:** Overarching Strategic Framework presents a forward-looking Framework built on national needs and circumstances, focusing on policy, perspectives and elements of geospatial information. It sets the context of 'why' geospatial information management is a critical element of national social, economic and environmental development.
- **Part 2:** Implementation Guide is the detailed document that provides the 'what', the specific guidance and actions to be taken in implementing the Framework. The aim is to provide guidance for governments to establish 'nationally' integrated geospatial information frameworks in such a way that transformational, albeit staged, change is enabled, visible and sustainable.
- **Part 3:** Country-level Action Plans will provide templates and guides to operationalize the Framework in a national and sub-national context. Providing the 'how, when and who' approach, this document will assist countries to prepare and implement their own country-level Action Plans taking into consideration national circumstances and priorities.

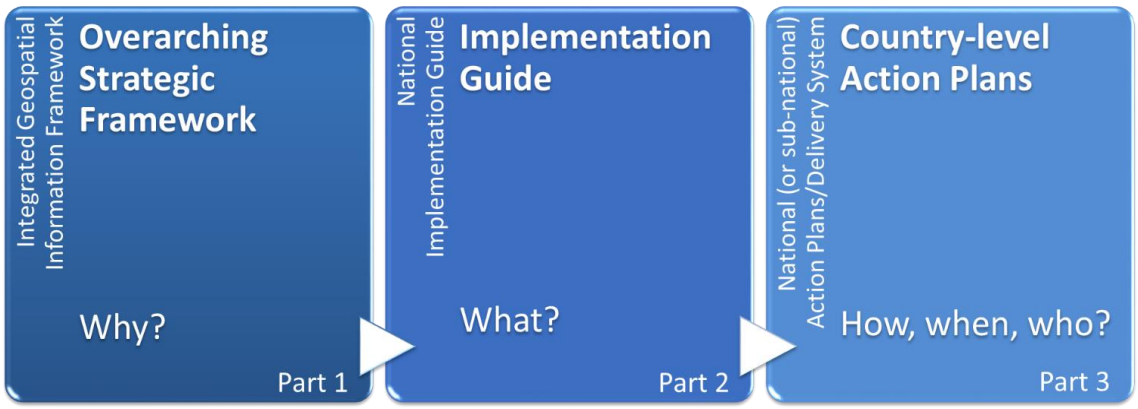

Figure 1: The 3 component documents of the Integrated Geospatial Information Framework

World Bank IGIF Implementation Methodology

The World Bank Group has established an IGIF Implementation Methodology and corresponding analytical toolkit to support the use of the IGIF and incrementally create SDIs customized to specific countries and priorities. The graphic below illustrates the sequence and relationship of these analytical tools used to arrive at the implementation of the SDI. The symbology shows the analytical tools (in orange), key inputs (in blue), the IGIF in purple, outcomes (in green) and uses arrows to different types of information flows.

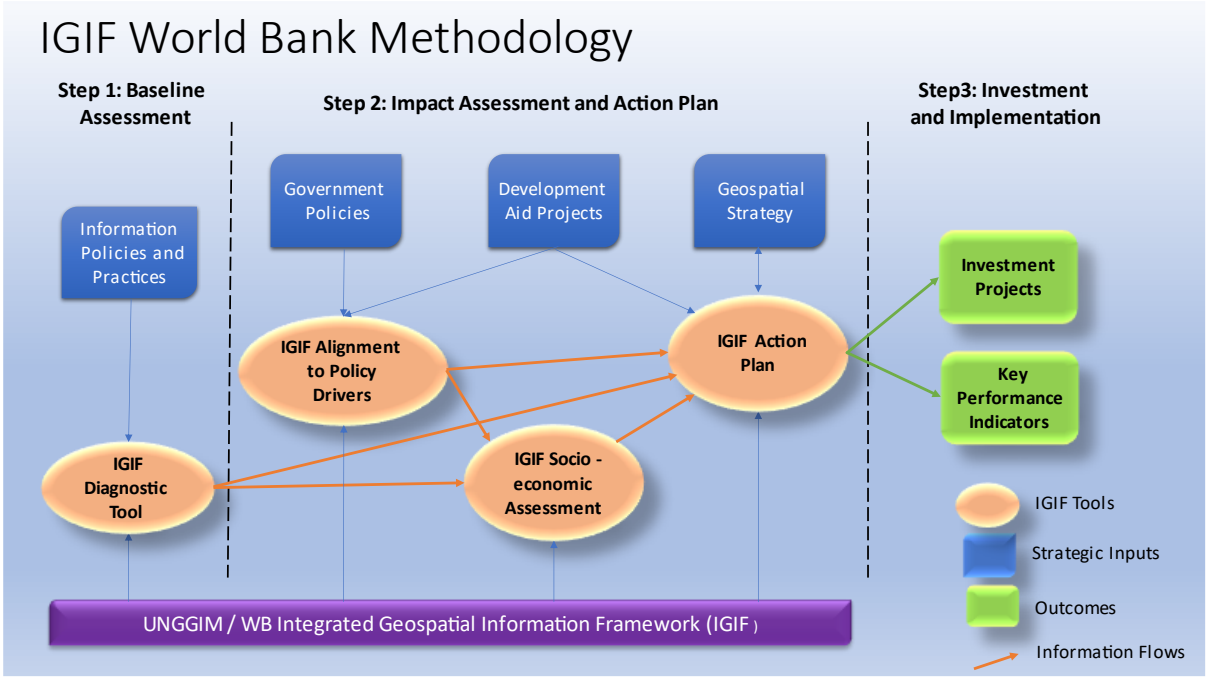

Figure 2: World Bank IGIF Implementation Methodology

In summary, this methodology has been applied as follows:

Step 1: Baseline Assessment

A single integrated tool is used for this purpose:

Analytical Tool 1 - IGIF Baseline Diagnostic Tool (DT): this provides an assessment of the "as is" position of geospatial information management in the country, structured around the nine IGIF pathways, including governance, policy, financial, human capacity, and technical perspectives. The output forms a baseline for the next steps.

Step 2: Impact Assessment and Action Plan

Three tools are used to build a prioritized, cost-justified roadmap for strengthening integrated geospatial information management:

Analytical Tool 2.1 - IGIF Alignment to Government Policy Drivers: this tool is used to align the Government's strategic objectives and international commitments to specific spatial use cases (applications) and then prioritizes them based on how well they support and accelerate achieving these strategic objectives.

Analytical Tool 2.2 - IGIF Socio-economic Impact Assessment: this tool delivers an assessment of the socio-economic business case for investment in an SDI from both qualitative and quantitative perspectives. It is informed by the outputs from the two tools outlined above.

Analytical Tool 2.3 – IGIF Action Plan: this tool builds on the previous deliverables to create or update a high-level geospatial strategy and a corresponding costed roadmap for SDI enhancements, presented as a series of interdependent policy interventions and implementation projects.

Step 3: Investment and Implementation

Once the Action Plan has been approved in terms of scope, investment plan and priorities, then work will commence to identify sources of government and international funding. Individual actions may also need to be specified in greater detail to support implementation planning and the definition of Key Performance Indicators (KPIs) to monitor and evaluate implementation.

These steps must be delivered within a recognized project management methodology that provides appropriate governance and incorporates transparency and accountability for all tasks and outcomes.

DOCUMENT STRUCTURE

The report is structured as follows:

- **Chapter 1: Context** - provides a brief introduction to the origin of the report, [Country] and the current status of its geospatial information management.

- **Chapter 2: Country overview -** looks at the geography, administrative structures and economic factors that underpin the recommended set of actions (interventions).

- **Chapter 3: Geospatial Information Management in [Country]** – provides a baseline ("as is") assessment of the current state, summarizes current initiatives and examines some of the barriers to optimal implementation of the NSDI.

- **Chapter 4: Strategic Alignment to Policy Drivers** – describes national policies initiatives and international commitments that might be facilitated by developing the NSDI.

- **Chapter 5: Vision** – lays out a set of set of strategic objectives, guiding principles and goals.

- **Chapter 6: Action Plan** – is the main part of the document, outlining a set of actions based on the nine strategic pathways used to structure the IGIF, to achieve progress towards building a sustainable NSDI for [Country].

- **Chapter 7: Implementation Plan** – outlines a costed plan, which it is envisaged will form the basis for delivering the actions.

- **Chapter 8: Business Plan** – provides a summary of the accompanying Socio-economic Impact Assessment, setting out the justification for the investment required to implement the action plan.

- **Chapter 9: Conclusions and Next Steps** – covers what has been learnt from this work and indicates what needs to happen next.

- **Appendices and Annexes** – are used for additional reference material.

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EXECUTIVE SUMMARY

i. Context

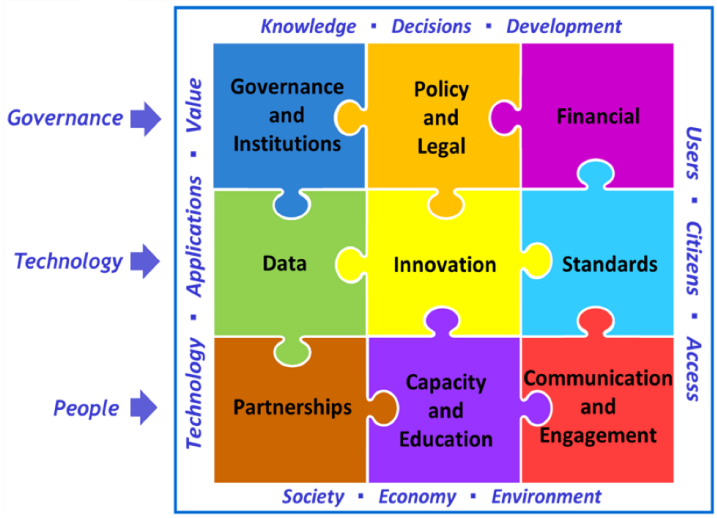
Example of text for this section.

This report was prepared at the request of [Agency] within the Ministry of [Name of Ministry] as part of Technical Assistance to the Government of [Country] for Geospatial Information Management within the World Bank Urban, Resilience and Land Global Practice (GPURL), Global Land and Geospatial Unit.

ii. Integrated Geospatial Information Framework (IGIF)

The Action Plan is created in accordance with the UN-GGIM IGIF , its principles and methodologies. The Framework has been developed by the UN-GGIM in collaboration with the World Bank. It was endorsed by the UN-GGIM Committee of Experts in August 2018.

The IGIF is anchored by nine strategic pathways within three main areas of influence: governance; technology; and people. These nine strategic pathways seek to maximize the innovative and integral nature of geospatial information by making it available and accessible to governments, communities, businesses, academia and civil societies. This provision serves to innovate, co-create and develop new products, services and applications that deliver new knowledge for evidence-based policy and decision-making.



iii. Geospatial Information in [Country]

Example of text for this section.

The government of [Country] has identified the need for a National Spatial Data Infrastructure (NSDI) to generate efficiencies through the establishment of a single unified capability for the acquisition, management and dissemination of foundation geospatial information.

Considerable volumes of geospatial information covering the foundation themes[4] that form the basis for a NSDI already exist in [Country]. However, the quality (accuracy, completeness and currency) is variable and interoperability of systems is limited. Outside the capital [City],

[4] The United Nations defines 14 themes as necessary to building a national infrastructure, to which [Country] has added two additional themes: public base topo map and historical and cultural sites.

much of the mapping information dates from the 1970s and is at levels of detail insufficient for current and future needs.

iv. Baseline Assessment

[Country] has completed a baseline assessment of current geospatial information management practices in [Date]. The following discussion, organized in terms of the IGIF strategic pathways, reflects the findings of this baseline assessment. A score of 100 is the maximum achievable, and awarded only if the NSDI, in relation to the strategic pathway being assessed, is fully developed and sustainable.

The Baseline Assessment Scores, and a description of the current situation is as follows:

Example for this section to be overwritten.

- **Governance and Institutions (Score = 68):**

  [Country] has high-level support for the implementation of the NSDI and has made significant headway in the development of a geospatial strategy and policy. The interim Task Force provides strategic direction for activities, and specialist working groups are currently focusing on key aspects of the NSDI. However, there is an urgent need to formalize the NSDI governance model and associated roles and responsibilities that describe how agencies come together to support the NSDI Program.

- **Policy and Legal (Score = #):**
- **Financial (Score = #):**
- **Data (Score = #):**
- **Innovation (Score = #):**
- **Standards (Score = #):**
- **Partnerships (Score = #):**
- **Capacity and Education (Score = #):**
- **Communication and Engagement (Score = #):**

v. Strategic Alignment to Public Policy Drivers

Example for this section.

The study has analyzed a series of policies, which set out the [government's] plans for strategic investment. Based on this analysis, the following sectors are those where geospatial information generally and the NSDI particularly, can make the most significant and positive impact:

(a) **Land Administration including state land management**, valuation, land and property taxation, land use planning and monitoring.

(b) **National and Sectoral Development Planning** – adopting a holistic approach balancing economic diversification and social needs across all aspects of the urban and rural built environment and needs to meet Sustainable Development Goals (SDG).

(c) **SMART Government** – including e-governance, to optimally leverage digitalization opportunities to make the state more efficient and provide improved services to citizens.

(d) **Mining** – supporting the largest sector of the economy, facilitating export activities but also growth of raw materials processing in-country.

(e) **Transport** – extending the network of paved roads, introducing intelligent transport systems that integrate alternative modes, including rail and air.

(f) **Disaster and Emergency Management** – improving planning and response to all types of incidents.

(g) **Agriculture** – matching the need to improve food security whilst avoiding over-exploiting the carrying-capacity of the fragile ecosystem.

(h) **Utilities** – providing access to water, electricity, heating and telecommunications necessary to the welfare of citizens and development of business.

(i) **Environment and Tourism** – protecting the environment and attracting more visitors to the country.

(j) **Defense** – underpinning the security of the country.

(k) **Health** – supporting epidemiological studies, social research and health care, as well as decision-making contributing to the formulation of health-related policies and monitoring and managing the outbreaks of disease.

In addition, the priorities identified will need to support sustainable economic growth and yield practical and quality of life benefits to citizens.

The overall target outcome for the NSDI is to lead to the efficient, equitable and optimal utilization and management of geospatial information applied across all sectors of the economy but with an emphasis on land administration.

More than [Number] specific use cases, where positive impacts can be realized through implementation of the Action Plan have been documented. These are detailed in an accompanying geospatial alignment report.

vi. NSDI Vision and Mission

Example for this section.

The following vision and mission statements were developed in consultation with key NSDI stakeholders.

The vision statement reflects a common aspiration to deliver optimal use of geospatial information to effectively measure, analyze, monitor and achieve sustainable social, economic and environmental development – leaving no one behind.

> **Our Vision is for:**
>
> Geo-driven eGovernment and innovation that empowers efficient and effective use of geospatial information towards national sustainable development.

The mission statement recognizes that leaders will promote and support innovation and provide the guidance, coordination and standards necessary to deliver integrated geospatial information so that it can be leveraged to achieve sustainable solutions to current and future challenges.

> **Our Mission is to:**
>
> Strengthen integrated geospatial information management and promote the value of geospatial information through leadership, coordination, partnerships, advanced technology and geo-standards.

vii. Goals and Objectives

The four goals are statements of what needs to be accomplished to achieve the [Country] NSDI vision, and the objectives reflect how the goals will be accomplished.

Example Goals for this section are shown below. The Action Plan will typically have 4 to 7 goals.

Goal 1: Quality Information: Timely, reliable and fit-for-purpose integrated geospatial information that is the trusted source of information for government, business and the community.

The objective is to improve the quality of geospatial information for users by streamlining the collection and sharing of geospatial information through formal data governance processes, standards compliance, quality control and end-user stakeholder consultation. The quality threshold set for each geospatial dataset will be different and should be a fit-for-purpose level that is affordable and realistic. The quality can then be improved over time when required.

Goal 2: Accessible and Useful: An integrated geo-platform where people can access, visualize, query and use integrated geospatial information for policy setting and evidence-based decision-making.

The objective is to create a system that interconnects interoperable geospatial information from multiple agencies and supports a variety of data formats for analyzing complex relationships, trends and patterns across a broad spectrum of applications so that new insights and solutions can be derived to tackle socio-economic and environmental challenges.

Goal 3: Good Governance: A legal and policy framework, geospatial standards framework and business investment plan that coordinates and integrates geospatial information management across both the public and private sectors.

The objective is to formulate a policy, legal, financial and standards environment that accelerates cross-sector coordination, industry partnerships and stakeholder collaboration for the effective and efficient generation, processing, storage, protection, sharing, distribution and ethical use of geospatial information.

Goal 4: Maximized Innovation: Geospatial information is used widely to improve government products and services, and stimulate new business opportunities for the benefit of all citizens.

The objective is to promote research and development, innovation programs and entrepreneurship by boosting technological capabilities and strengthening people's skills and knowledge capacity to use geospatial technologies innovatively.

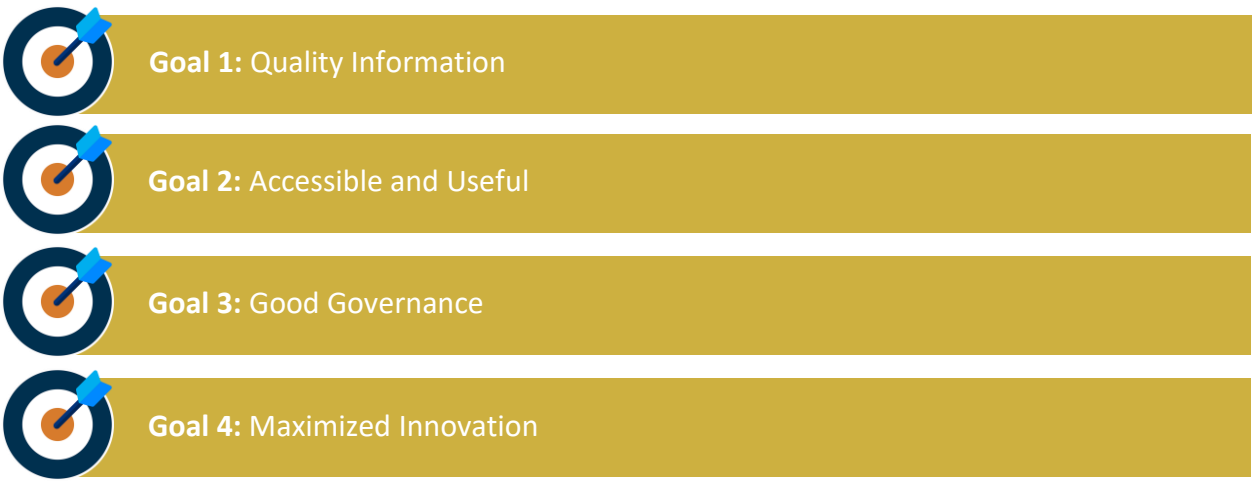


Figure 3 The four strategic goals

viii. Benefits and Outcomes

Example of text for this section.

Positive impacts are expected in many parts of the [Country] economy, including:

- **Creating new job opportunities** – particularly in the Information and Communication Technology (ICT) sector, but also in real estate, retail and financial services.
- **Improved public sector efficiency** – of institutions responsible for land administration, property taxation, spatial planning, transport and agriculture.
- **Generating citizen benefits** – through increased efficiency in road navigation, emergency services dispatch and improved, transparent interactions with the public sector, particularly in respect to land transactions and property taxation.
- **Greater private sector investment** – particularly in stimulating the land market and facilitating infrastructure development.
- **Improved adaptation to climate change** – through reductions in carbon emissions from vehicles, improving flood risk assessment and resilience to disasters.

ix. Action Plan

The Action Plan is designed for implementation of the NSDI over a 5-year timeframe and operation for a least a further 7 years. It contains a total of [number] inter-dependent actions that form an integrated roadmap with outlines of associated costs and timeframes. Actions are detailed in chapter 6 of this report under each strategic pathway and are summarized below.

Example of text for this section.

Strategic Pathway 1: Governance and Institutions

- Action 1.1, 1.2, 1.3, 1.4 and 1.5**:** Combined, these actions define the leadership roles that will drive the implementation of the NSDI, and how organizations work together to deliver and sustain the NSDI in the longer term. The governance model establishes the NSDI Governing Body (in progress), NSDI Coordination Unit and NSDI Working Groups and defines their roles and responsibilities.
- Action 1.6 and 1.7: Develops the Geospatial Strategy and formulates the value proposition, which are both essential for raising awareness of the need for an NSDI with decision makers, and the benefits and outcomes that can be achieved using integrated geospatial information.
- Action 1.8: Implements the Monitoring and Evaluation Framework to regularly monitor the progress of the NSDI Action Plan and track achievements.

Strategic Pathway 2: Policy and Legal

Strategic Pathway 3: Finance

Strategic Pathway 4: Data

Strategic Pathway 5: Innovation

Strategic Pathway 6: Standards

Strategic Pathway 7: Partnerships

Strategic Pathway 8: Capacity and Education

Strategic Pathway 9: Communication and Engagement

x. Implementation Plan

A draft implementation plan, with estimated costings for each activity, is set out in Chapter 7.

xi. Business Case

The strategic case for investment is derived from the geospatial policy alignment, socio-economic impact assessment and action plan. Key national priorities that are expected to be supported by the Action Plan are direct economic impacts, as well as societal and environmental benefits. In this section we draw out a small subset of these:

Example of benefits that can be used for this section are shown below.

Economic benefits

i) To Government

- **Increased revenue from land use fees and taxes** by completing the land/building cadastre and register.
- **Improved property tax revenue collection** from a single national street addressing system.
- **Support to the National Development Agency** with online access to more current and complete geospatial information.
- **Reduced costs of the subsidies systems** by identifying potentially fraudulent claims.

ii) To Business

- **Reduced conflicts between mineral exploration and local protected areas** by completion of cadastral registration of state land.
- **Increased crop yields** by use of precision agriculture techniques to link satellite imagery to fertilizer and chemical distribution.
- **Better asset management for utilities** - the NSDI program will enhance the availability of current geospatial data enabling digitalization of paper records to be more accurate and converted more quickly.
- **More efficient and less costly land and construction survey work** from the availability of more Continuously Operating Reference Stations (CORS) and real time positioning services.
- **The real estate sector enabled to use web technology** to provide new and improved commercial and residential property services to citizens using location data.

iii) **To Citizens**

- **Improved transport data to underpin more intelligent real time transport planning**.
- **Greater efficiency of transactions between citizens and businesses**, especially by having a single national address database augmented with geographical position.
- **Tools to allow better coordination of street works**, reducing traffic disruption and producing travel time efficiencies and fuel economies.

Societal benefits

Key impacts that are not easily expressed in economic terms, include:

- **Integration of land registration and cadastral registers providing a more transparent, consistent and up to date database** to underpin growth of the land market by increasing the level of mortgages secured on land rights.
- **Improved disaster response**, making mobilization faster, therefore reducing loss of life and costs of damage to forests, crops and property.
- **Mapping of crime scenes and finding patterns that relate incidents together** is facilitated by good topographic mapping data, therefore helping to reduce crime rates and improve public safety.
- **Improved SDG reporting** through enhanced geo-statistics.

Cost-benefit Impact Assessment

Quantified benefits have been fed into a Cost-benefit Analysis (CBA) model. This provides an "order of magnitude" assessment in financial terms of the Return on Investment (RoI). An exchange rate [Country currency] **to US$ of 2871.54**[5] is assumed for all calculations.

The analysis results in a Net Present Value (NPV) of 189.7 billion [Country currency] **(USD 66.1 Million) and a benefit-cost ratio (BCR) of 2.54, indicating the economic viability and attractiveness of the project.**

It is important to stress that this assessment is based upon quantification of under 20% of the identified use cases. If data and time were not constrained, it is our expert opinion that the calculated ROI would be significantly higher.

A separate report titled "[Country] NSDI – Socio-economic Impact Assessment" provides a full analysis of the economic case for investment. The cash flow forecast is shown in the chart below and detailed in section 6 of the report.

[5] XE Mid-Market Rate on 29th September 2020

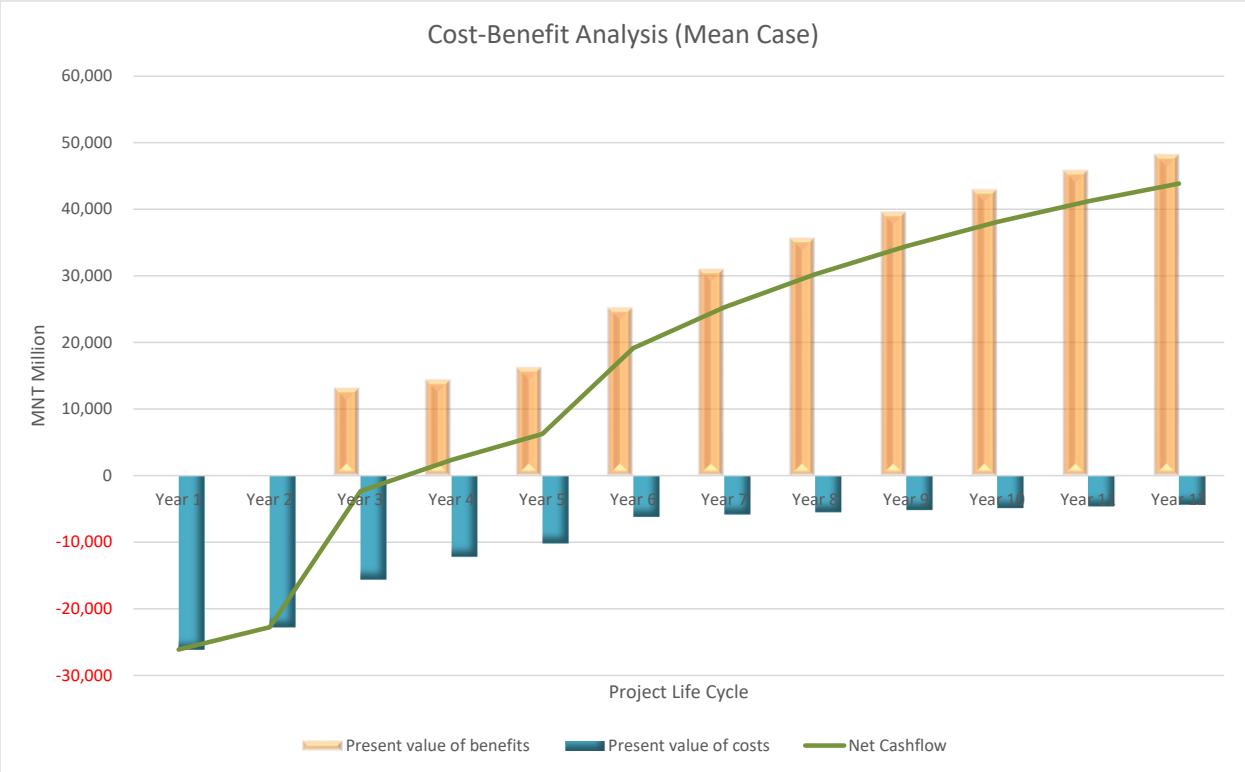


Figure 4 Order of Magnitude Cost-benefit Analysis

xii. Conclusions

This draft final version of the Action Plan is provided to stimulate discussion and aid refinement.

It should be noted that any Action Plan is a living document and will be refined and revised as additional information becomes available as a result of more detailed planning and throughout implementation.

1. CONTEXT

1.1 Purpose

Example of text for this section.

This report was prepared at the request of [Agency] within the Ministry of [Name of Ministry] as part of Technical Assistance to the Government of [Country] for Geospatial Information Management within the World Bank Urban, Resilience and Land Global Practice (GPURL), Global Land and Geospatial Unit.

1.2 Audience

Example of text for this section.

The primary audience for this report, are typically the stakeholders who contributed to the completion of the Baseline Assessment, Socio-economic Impact Assessment and/or the Geospatial Alignment to Policy Drivers Report.

1.3 Brief Country Description

Example of text for this section.

[Country] is in eastern Asia. It has a land area of [Area] km^2, making it the 18th largest country in the world - it is 3 times as large as France. The population in 2018 was estimated at 3,225,000 by the National Statistics Office[6]. However, it is one of the most sparsely populated countries on earth (average of 2 people per km^2).

1.4 Background on NSDI Activity

Example of text for this section.

Considerable volumes of geospatial information covering the foundation themes[7] that form the basis for a NSDI already exist in [Country]. However, the quality (accuracy, completeness and currency) is variable and interoperability of data and systems are limited. Outside the capital [capital name], much of the mapping information dates from the 1970s and is at levels of detail insufficient for current and future needs.

[6] http://www.1212.mn/

[7] The United Nations defines 14 themes as necessary to building a national infrastructure, to which [Country] has added two additional themes: public base topo map and historical and cultural sites.

1.5 Key Organizations / Stakeholders

A list of the main institutions involved in completing the DT – key contacts and web links are sufficient as the next analytical stage, strategic alignment to policy drivers, is designed to elaborate these aspects.

The following Stakeholders have contributed information to this Baseline Report, through workshops, questionnaires and/or interviews. Stakeholders' details are included in Appendix A.

2. [COUNTRY]

In this section, the report seeks to provide detail to allow external readers to understand the context into which the National Spatial Data Infrastructure (NSDI) is being introduced.

2.1 Geography

Add a brief overview of the Geography and a Map

Figure 5 Political Map of [Country]

2.2 History

Add half page on history

2.3 Climate

Add a paragraph on climate

2.4 Government

Add a paragraph on the government

2.5 Administrative Structure

Add a paragraph on the administrative structure – e.g., national, province, local

2.6 [Major City]

Add a paragraph on the major city/s

2.7 Economy

Add commentary on the economy. For example

[Country] is classified as a lower middle-income country by the World Bank[8]. Figure 6 shows [Country] in relation to other comparable countries in respect to the components of the World Bank's Human Development index[9]. It ranks [#]nd in the world, a little lower than its neighbor to the south, China (85). Philippines (106), Kyrgyzstan (122) and Vietnam (118) are comparable countries in the region.

[8] World Bank country classification for lending: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups

[9] Human Development Index: http://hdr.undp.org/en/content/2019-human-development-index-ranking

Example chart

-	Rank	Country	Human Development Index (HDI) (value)	Life expectancy at birth (years) SDG3	Expected years of schooling (years) SDG 4.3	Mean years of schooling (years) SDG 4.6	Gross national income (GNI) per capita (PPP $) SDG 8.5
	76	Mexico	0.767	75.0	14.3	8.6	17,628
	77	Thailand	0.765	76.9	14.7	7.7	16,129
	78	Grenada	0.763	72.4	16.6	8.8	12,684
	79	Brazil	0.761	75.7	15.4	7.8	14,068
	79	Colombia	0.761	77.1	14.6	8.3	12,896
	81	Armenia	0.760	74.9	13.2	11.8	9,277
	82	Algeria	0.759	76.7	14.7	8.0	13,639
	82	North Macedonia	0.759	75.7	13.5	9.7	12,874
	82	Peru	0.759	76.5	13.8	9.2	12,323
	85	China	0.758	76.7	13.9	7.9	16,127
	85	Ecuador	0.758	76.8	14.9	9.0	10,141
	87	Azerbaijan	0.754	72.9	12.4	10.5	15,240
	88	Ukraine	0.750	72.0	15.1	11.3	7,994
	89	Dominican Republic	0.745	73.9	14.1	7.9	15,074
	89	Saint Lucia	0.745	76.1	13.9	8.5	11,528
	91	Tunisia	0.739	76.5	15.1	7.2	10,677
	92	Mongolia	0.735	69.7	14.2	10.2	10,784
	93	Lebanon	0.730	78.9	11.3	8.7	11,136
	94	Botswana	0.728	69.3	12.7	9.3	15,951
	94	Saint Vincent and the Grenadines	0.728	72.4	13.6	8.6	11,746
	96	Jamaica	0.726	74.4	13.1	9.8	7,932
	96	Venezuela (Bolivarian Republic of)	0.726	72.1	12.8	10.3	9,070
	98	Dominica	0.724	78.1	13.0	7.8	9,245
	98	Fiji	0.724	67.3	14.4	10.9	9,110
	98	Paraguay	0.724	74.1	12.7	8.5	11,720

Figure 6: Human Development Index Ranking

The [Country} economy has recently been driven predominantly by the natural resource sector which contributed 24.3% of GDP. This is also reflected in export earnings, where 86.6% are derived from mining products.

The economy of [Country] has been recovering from economic recession which accompanied the Global Financial Crisis and constraints imposed as a result of the IMF refinancing intervention. However, the economy grew by 7.3% in the first half of 2019. In 2018 economic growth was 7.2% compared with 5.3% in 2017, and 1.2% in 2016, when the economy started to emerge from the effects of the 2008 global financial crisis. The growth has been driven mainly by higher private consumption, strong Foreign Direct Investment (FDI), and commodity price growth.

The country's fiscal balance has been improved from a 15.3% deficit of GDP in 2016 to a 3.4% surplus in the first half of 2019. Government debt reduction contributed to this positive fiscal balance. Currently, the inflation rate is 9% mostly driven by solid fuel, meat, and gasoline price increases. [Country] bank's policy rate is 11% which was last updated in November of 2018.

Whilst the economic outlook is largely positive[10], the potential downside risks include:

[10] This section was drafted before the COVID-19 pandemic.

- Political uncertainty – there is an election due in mid-2020.
- Downward pressure on commodity prices.
- Border issues – principally, the capacity of border authorities to handle the volume of mineral resources crossing into China.
- Implementation delay of megaprojects.
- Slower implementation of banking sector reforms – as committed to under the IMF re-financing package.

In response to these opportunities and risks, the [Country] Government has set the following fiscal policy priorities for 2020:

i) Maintain fiscal discipline, by implementing policies to reduce the budget deficit.
ii) Implementing efficient debt management to make bond repayment of a total 2.9 billion USD between 2021 and 2024.
iii) Implementing tax reform which includes supporting business, investment, and job creation.
iv) Customs reform to facilitate foreign trade and improve tax collection efficiency from natural resources.
v) Continuing to implement social care reform to rationalize benefits and accessibility payments.
vi) Digitalizing land registration and promoting transparency to improve public service delivery and increasing revenue collection efficiency.
vii) Completing ongoing projects and commencing projects focused on delivering value to the public.

Digital land registration (vi) is clearly the key intercept for NSDI. However, there are also strong alignments with policy priorities concerning tax reform (iii) and delivery of value to the public (vii).

3. GEOSPATIAL INFORMATION MANAGMENT

3.1 Overview

Add commentary on the country. For example

Considerable volumes of geospatial information covering the foundation themes[11] that form the basis for a NSDI already exist in [Country]. However, there is a lack of data and knowledge sharing culture, which results in wasteful duplication of effort, and decision making based on incomplete and inconsistent information. Multiple "geo-portals" have been created to facilitate data usage and exchange, but they are not well maintained and awareness amongst citizens and business users of their existence is very low.

3.2 Baseline Assessment

Add commentary on the baseline assessment.

[Country} has completed a baseline assessment of current geospatial information management practices in [date]. The baseline assessment reflects the degree to which [Country] has developed in terms of each IGIF strategic pathway. This baseline assessment has been mapped to the World Bank IGIF Diagnostic Tool, which applies scores so that progress can be measured from the current starting point. The scores have been averaged to provide an overall score for the [Country] geospatial infrastructure.

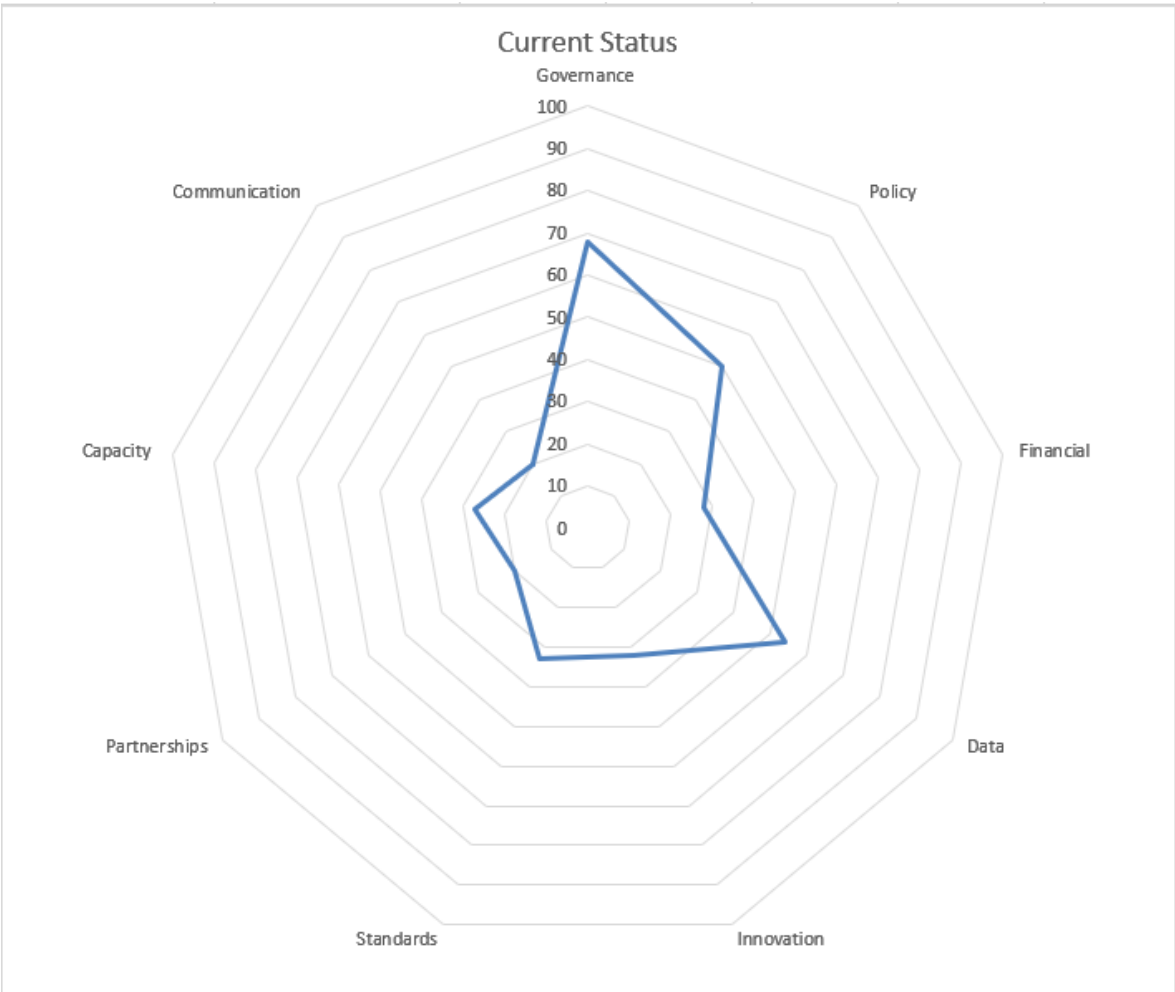
The score for the Governance and Institutions Strategic Pathway for example, is the average score from eleven questions on the indicator subject. For each of the questions, the score increases the more that an indicator is "complete". For example, if there is no NSDI Coordinating Unit the score is zero; if one has been planned only, and has not been taken further the score is 25; if one has been planned and the plans have been developed into formal Terms of Reference then the score is 50; if the body has Terms of Reference and people allocated to positions the score is 75, and if the Coordinating Unit exists and is active the score is 100.

It is important to appreciate that the precision of the scores is not so important – scores could be argued up or down in many cases, but an overall picture emerges and provides a benchmark against which further progress can be measured.

[11] The United Nations defines 14 themes as necessary to building a national infrastructure, to which [Country] has added two additional themes: public base topo map and historical and cultural sites.

Scores for the individual Strategic Pathways are reported in tabular and graphical form thus:

Governance and Institutions	68
Policy and Legal	50
Financial	28
Data	54
Innovation	32
Standards	10
Partnerships	20
Capacity and Education	27
Communication and Engagement	20



Taking each axis individually the results are:

Add commentary on each pathway. For example

Governance and Institutions (Score = 68)

Current Situation

[Country] has high-level support for the implementation of the NSDI and has made significant headway in the development of a geospatial strategy and policy. This is partly from having an NSDI advocate, a designated agency responsible for driving the NSDI initiative, an interim Task Force that is overseeing and providing strategic direction for activities, and specialist working groups focusing on key aspects of the NSDI. These governance achievements are reflected in the results of the diagnostic, which show [Country] is instituting sound processes for the future NSDI.

Identified Needs

What is currently lacking is a governance model and associated roles and responsibilities that describe how agencies come together to support the NSDI Program. This includes the establishment of working groups to support the work of the NSDI Coordination Unit and NSDI Governing Body. In terms of leadership, an NSDI Geospatial Strategy is required, along with a well-formulated value proposition statement, to drive change and provide the necessary impetus to deliver the implementation plan.

Policy and Legal (Score = #)

Current Situation

Identified Needs

Financial (Score = #)

Current Situation

Identified Needs

Data (Score = #)

Current Situation

Identified Needs

Innovation (Score = #)

Current Situation

Identified Needs

Standards (Score = #)

Current Situation

Identified Needs

Partnerships (Score = #)

Current Situation

Identified Needs

Capacity and Education (Score = #)

Current Situation

Identified Needs

Communication and Engagement (Score = #)

Current Situation

Identified Needs

3.3 Barriers to NSDI

Add commentary on the barriers to the NSDI. For example:

There are a number of barriers to achieving a NSDI. However, none are insurmountable and all can be overcome using good governance and policy, adequate and sustained financial resources, having a highly committed stakeholder base and capacity building strategies. Potential barriers to achieving the NSDI are noted as:

- **Institutional arrangements and user/provider relationships:** The lack of geospatial information management coordination at a national level is imposing significant constraints on the development of a NSDI. Impediments include limited inter-organizational communication. Specific steps need to be defined and implemented to ensure that government agencies work together to reduce costs, share data, avoid duplication of effort, and recognize the important role that the private sector and academia can play. User demands are likely to trigger the necessary partnerships and alliances to produce and share information.
- **Lack of consistent policies concerning access to and use of geospatial data:** The lack of a Policy and Legal Framework for the NSDI may have a critical impact on NSDI development as organizations are not aware of information management policies, such as data ownership, usage, pricing, data exchange, data access and security, and licensing and copyright.
- **Inconsistencies in the availability and quality of geospatial data:** Data sharing is often obstructed because of concerns over data quality and currency. Data quality issues are not easily resolved without a specific program of work directed at data quality improvement. There is currently a lack of qualified staff to undertake data cleansing tasks.
- **Limited skills in the collection, processing, management and use of geospatial data:** The NSDI requires a workforce with knowledge and skills across a range of areas. There is limited uptake of geospatial sciences by secondary school graduates and more awareness of geospatial as a profession is required. Capacity development on geospatial information, data governance, standards, application development, project management and policy development are required.
- **Lack of training in the utilization of enabling technologies:** A lack of people and capacity to build the infrastructure could impede the development of the NSDI. This includes limited capacity in education, and lack of technical skills in enabling technologies, data management and standards. In addition, a lack of research and development skills and lack of knowledge about the geographic information market may hinder progress.

4 STRATEGIC ALIGNMENT TO POLICY DRIVERS

4.1 Introduction

This section is standard text that can be adopted.

It is critical that the Action Plan is aligned to maximize support to implementing key Government policies and meeting international commitments.

A separate deliverable, the geospatial policy alignment, shows the analytical work undertaken to ensure the Action Plan meets this objective. It does this by:

i) Identifying National policy and International commitments that can be positively impacted by optimum use of geospatial information.

ii) Prioritizing drivers for investment by identifying and prioritizing key thematic areas for NSDI investment based on:

   a) relevance of NSDI to high-level implementation of the policy or International commitment;

   b) achievability within the timeframe for implementation; and

   c) alignment with sponsor's business entry point(s), such a land administration or disaster risk management.

iii) Describing spatial use cases that, from interactions with stakeholders and knowledge of the geospatial market, offer an "a priori" assessment of the highest socio-economic impact.

iv) Analyzing key stakeholders – outlining relevant functions, their structure (centralized or distributed) and influence in terms of geospatial information policy.

In this section, only the key learnings from this analysis are summarized.

4.2 National Policy and International Policy Commitments

4.2.1 National Policy

Add table on national commitments. For example:

The table that follows outlines the primary policies that are positively aided by geospatial information and technology.

Ref	Theme	Summary Description of Primary Policies	Importance of Geospatial Technologies
1	Land Administration	**National Program on One Citizen-one Registry[12],** endorsed by Government of [Country], 23 May 2018 No.144 **Government of [Country] Program 2016-2020[13],** endorsed by Parliament of [Country], 09 September 2016 No.45 **Vision 2050 Long-Term Development Policy of [Country],** comprehensive vision relating to aspects of [Country] development including spatial planning, eGovernment, agriculture, land administration system etc. **Goal 1 (2021-2030):** It is time to increase the effectiveness and accessibility of [Country]'s land relations, geodesy and cartography policy, planning and implementation, and to create conditions for the population to live in a healthy, safe and comfortable environment. **Goal 2 (2031-2040):** Introduce a smart, citizen-centered integrated land management system with location-based spatial information. **Goal 3 (2041-2050):** It is a time to ensure equality, justice, national economic security and sustainable development through the implementation of an integrated management system of smart, citizen-centered land.	Creating a consolidated database of cadastral, property, addressing and building information. Ensure equality, justice, national economic security and sustainable development through the implementation of an integrated management system of smart, citizen-centered land. Under the Vision 2050 there will be: • An environment for rational and efficient use of land and its resources, and open and transparent land relations for citizens and the public. • An integrated land exchange and multi-purpose cadastral system has been introduced, and a unified land fund and state control system over its use have been improved. • A permanent land use and monitoring system will be established, and a system of land protection and rehabilitation will be established. • Renew and improve the geodetic network of [Country] and provide the whole territory with topographic maps of all scales. • Strengthened integrated land management system. • A unified national spatial information platform has been developed and used. • An inclusive and smart land management system established and strengthened.

[12] National Program on One Citizen-one Registry available at https://www.legalinfo.mn/law/details/13476?lawid=13476

[13] Government of [Country] Program 2016-2020 available at https://www.legalinfo.mn/law/details/12120?lawid=12120

4.2.2 International Commitments

Add commentary on International Commitments. For example:

[Country] is a signatory to 573 International treaties[14]. However, there are, a small number of global initiatives that are of particular relevance:

Ref	Policy Area	Summary Description of Primary Policies	Importance of Geospatial Technologies
50	**Sustainable Development**	**Transforming our World: 2030 Agenda for Sustainable Development. UN Resolution 70/1[15]** This Agenda is a plan of action for people, planet and prosperity. It also seeks to strengthen universal peace. We recognize that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development.	Geospatial data is essential to monitoring and reporting on many of the SDG's goals and targets.
51	**Disaster Risk Reduction**	**Sendai Framework on Disaster Risk Reduction 2015 – 2030[16]** The framework aims to achieve the substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.	Geospatial data and systems are key components of the National Emergency Management Agency approach to implementing the framework.
52	**Climate Change**	**United Nations Framework Convention on Climate Change (Paris accord)[17]** The Paris Agreement builds upon the Convention and for the first time brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects, with enhanced support to assist developing countries to do so. As such, it charts a new course in the global climate effort.	Global environmental monitoring relies on satellite imagery and other NSDI foundation data themes, such as water, transport and land use.

[14] International treaties is available at https://www.legalinfo.mn/law/?cat=29
[15] Transforming Our World available at https://sustainabledevelopment.un.org/post2015/transformingourworld/publication
[16] Sendai Framework is available at https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030
[17] Paris Agreement is available at https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

4.3 Geospatial Use Cases

Add commentary on geospatial use cases. For example:

From face-to-face interviews with more than 25 stakeholder organizations, including Government Ministries, agencies, State-owned enterprises and private sector companies, the team identified over 60 applications (use cases) where there are demonstrable benefits from the implementation of Geospatial Information Systems (GIS) technology requiring foundation geospatial data[18] that an NSDI and enhanced land administration solution would provide. These positively impact many sectors including:

Land Administration:

- Fewer land-related court cases.
- Reduction of compensation payments for expropriation of land for infrastructure projects, such as transport and public works.
- Increasing revenue from land use fees and taxes.
- Growth in the value of the land market from improved security of tenure (increasing the volume of bank loans secured on land rights.
- The potential to increase revenue from land auctions through complete knowledge of the extent of State land and identification of more land for which rights can be sold.
- Increasing Land Value Capture by selling other rights on State land such as advertising, temporary car parking and retail developments.

Strategic Economic and Urban Planning:

- Support to the National Development Agency with online access to more current and complete geospatial information.
- Enhanced urban planning and smart city projects through access to 3D "digital twin" information models.
- Web accessible GIS tools to visualize data geographically for government decision makers.
- Taxation at an individual property level enabling fairer system to be introduced based on market pricing and facilitating collection, particularly in densely developed central areas of the capital city.
- Support to the National Statistics Office to undertake more sophisticated spatial analyses of census and other survey information.

[18] Foundation Data Themes: http://ggim.un.org/meetings/GGIM-committee/8th-Session/documents/E-C20-2018-7-Add_1-Global-fundamental-geospatial-data-themes.pdf

eGovernment

- Integration of land registration and cadastral registers providing a more transparent, consistent and up to date database to underpin growth of the land market by increasing the level of mortgages secured on land rights.
- Improving the efficiency of transactions between citizens and businesses, especially by having a single national address database augmented with geographical position.
- Augmenting the National Information Infrastructure with geospatial attributes.

Transport

- Data to underpin more intelligent real time transport planning.
- Tools to allow better coordination of street works, reducing traffic disruption and producing travel time efficiencies and fuel economies.
- Essential location information to support measures to reduce border crossing congestion.
- Detailed spatial analysis for accident “black spots” helping more intelligent decision making on safety improvements.
- Improving utilization of available parking places in the capital city, raising more revenue and facilitating reduction of traffic congestion and journey times.

Disaster Risk Management and Emergency Services

- Improved disaster response, making mobilization faster therefore reducing loss of life and costs of damage to forests, crops and property.
- Speeding up emergency dispatch response times by locating incidents using address and points of interest, consequently police, fire and ambulance services can arrive more quickly.
- Mapping of crime scenes and finding patterns that relate incidents together is facilitated by good topographic mapping data, therefore helping to reduce crime rates and improve public safety.
- Easier and more efficient planning for policing of major events such as visits by foreign dignitaries.

Mining

- More efficient and less costly land and construction survey work from the availability of more CORS and real time positioning services.
- Reduced conflicts between mineral exploration and local protected areas by completion of cadastral registration of State land.
- Facilitating geological mapping by access to up-to-date NSDI data from mobile devices, expediting work and reducing costs.

Agriculture

- Reducing the costs of the subsidies systems by identifying potentially fraudulent claims.

- Better rangeland monitoring to match carrying capacity to quality of pasture, therefore avoiding over grazing and land degradation.
- Location-based livestock tracking to improve animal health.
- Increasing crop yields by use of precision agriculture techniques to link satellite imagery to fertilizer and chemical distribution.

Health and Social Care

- Patient address information can facilitate better planning of health facility locations and capacity.
- Better NSDI data will allow improvements to be made in epidemiology, helping to trace patterns in the spread of diseases and supporting control measures.
- Social benefits represent a significant proportion of budgets in both central, regional and local government – finding fraud is supported by better address data linked to citizen ID cards.

Utilities

- Asset management - the NSDI program will enhance the availability of current geospatial data enabling digitalization of paper records to be more accurate and converted more quickly.
- Selecting sites for alternative energy schemes, particularly wind and geothermal will be aided by being able to visualize and analyze integrated themes of geospatial data.
- Heat loss from central heating systems can be pinpointed using thermal imagery.
- Water contamination sources and leakages can be identified by analysis of pipe networks.

Commercial

- In the retail sector the use of geocoded street addresses can be combined with loyalty cards to target sales campaigns.
- The banking sector can similarly use NSDI data to plan new branch locations more effectively.
- The real estate sector can use web technology to provide new and better commercial and residential property services to citizens using location data.

Other sectors

- Further use cases have been identified in environment, tourism and culture.

4.4 Key Stakeholders

Add commentary on stakeholders. For example:

The study has involved discussions with a wide range of stakeholders. The accompanying geospatial policy alignment deliverable includes detailed assessment of all substantive stakeholders, both suppliers, and current and potential users. Each is described according to the following criteria:

- **Functions** – the entries are derived from their mission statements and other public statements; only those functions most directly relevant to the development of the NSDI are listed.
- **Centralized / Decentralized** – this characteristic will help in assessing the feasibility of certain strategic options, for instance, whether a distributed approach to data sharing will be impeded by low bandwidth or intermittent availability of suitable internet access.
- **Influence** – examining the current level of capabilities, commitment, existing data assets and user needs is used to assess the likely influence of the stakeholder in the future development of an NSDI.

A full list of the stakeholders appears as Annex B, not all have been directly engaged at this stage.

5. STRATEGY

5.1 Vision and Mission

The following vision and mission statements were developed in consultation with key stakeholders at the 'Integrated Geospatial Information Management' Stakeholder Workshop held on [Date]. The workshop agenda is provided in Appendix B.

The vision statement reflects a common aspiration to deliver optimal use of geospatial information to effectively measure, analyze, monitor and achieve sustainable social, economic and environmental development – leaving no one behind.

Our Vision is for:

Geo-driven eGovernment and innovation that empowers efficient and effective use of geospatial information towards national sustainable development.

The mission statement recognizes that leaders will promote and support innovation and provide the guidance, coordination, and standards necessary to deliver integrated geospatial information so that it can be leveraged to achieve sustainable solutions to current and future challenges.

Our Mission is to:

Strengthen integrated geospatial information management and promote the value of geospatial information through leadership, coordination, partnerships, advanced technology and geo-standards.

5.2 Strategic Goals and Objectives

There are [number] strategic goals and objectives (Figure 7). Achieving these goals and objectives will enable [Country] to achieve its vision for [add vision statement]. These goals and objectives were developed in consultation with key stakeholders at the 'Integrated Geospatial Information Management' Stakeholder Workshop.

Goal 1: Quality Information

Timely, reliable and fit-for-propose integrated geospatial information that is the point of truth and trusted source of information for government, business and the community.

The objective is to improve the quality of geospatial information for users by streamlining the collection and sharing of geospatial information through formal data governance processes, standards compliance, quality control and end-user stakeholder consultation.

Goal 2: Accessible and Useful

> An integrated geo-platform where people can access, visualize, query and use integrated geospatial information for policy setting and evidence-based decision-making.

The objective is to create a system that interconnects geospatial information from multiple agencies and supports a variety of data formats for analyzing complex relationships, trends and patterns across a broad spectrum of applications so that new insights and solutions can be derived to tackle socio-economic and environmental challenges.

Goal 3: Good Governance

> A legal and policy framework, geospatial standards framework and business investment plan that coordinates and integrates geospatial information management across both the public and private sectors.

The objective is to formulate a policy, legal, financial and standards environment that accelerates cross-sector coordination, industry partnerships and stakeholder collaboration for the effective and efficient generation, processing, storage, protection, sharing, distribution and ethical use of geospatial information.

Goal 4: Maximize Innovation

> Geospatial information is used widely to improve government products and services, and stimulate new business opportunities for the benefit of all citizens.

The objective is to promote research and development, innovation programs and entrepreneurship by boosting technological capabilities and strengthening people's skills and knowledge capacity to use geospatial technologies innovatively.

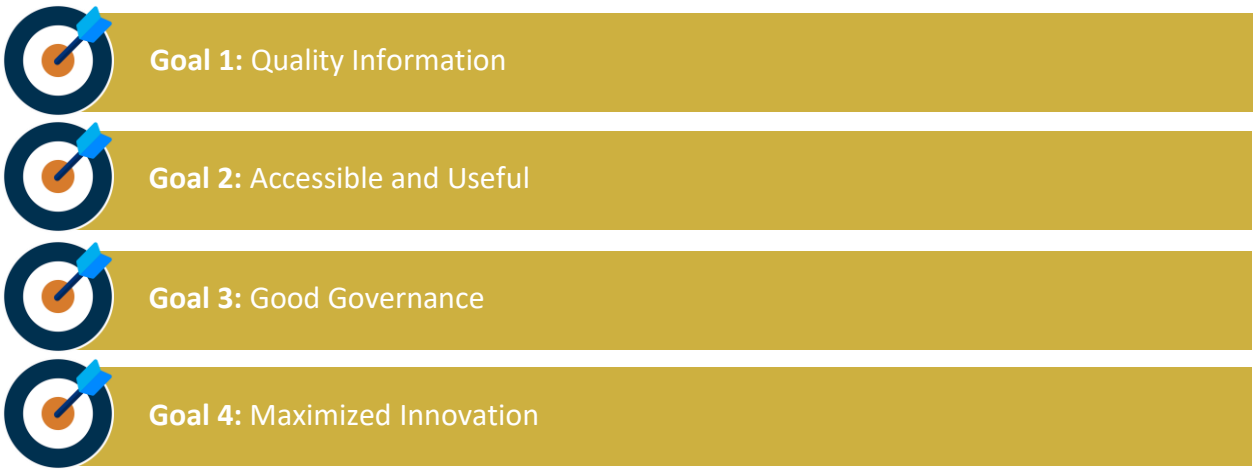


Figure 7 The four strategic goals

5.3 Enabling Technology

Add commentary on enabling technology. For example:

[Country] is well-positioned to take advantage of modern technologies to advance decision-making and government policy-setting using the power of geospatial information. Many government departments are familiar with geospatial information and are using this information on a daily basis.

Impediments to NSDI implementation have in the past often focused on lack of technology e.g., capture devices, hardware and software and data. In most cases, technology limitations have eased with increased competition in the market driving down unit costs. Similarly, access to high quality satellite imagery, the success of crowd-sourcing initiatives and smartphone-derived location-based services has reduced the timescales and costs of NSDI data acquisition and the development of new products and services.

However, reaping the full benefits of the opportunities, afforded through the use of geospatial data and technologies, requires continuous reform and innovation to modernize and support new ways of working, particularly across the public sector. The challenges for [Country] are to:

- Improve the quality of geospatial information as base maps are currently out of date, and some data themes, such as land parcel boundaries have not been mapped.
- Improve data accessibility so it can be leveraged more fully to generate economic growth through businesses and new start-ups taking advantage of the power of geospatial information.

The following enabling technologies will support [Country] to move beyond the collection of data and narrow usages to a thriving location-based services market.

- **National Map Portal and OneMap:** Technological advances in geospatial information management have been influenced by a new industrial paradigm – Industry 4.0; where individualized production, horizontal integration in collaborative networks and digital integration of supply chains have emerged to create new ways of producing and distributing information products beyond a single enterprise. Through the implementation of the National Map Portal and One Map, [Country] is able to increase access to geospatial information that is integrated across government services, and in doing so achieve a vibrant market for location-based services.
- **Increased Volume and Variability of Data:** Globally, we are witnessing an exponential growth in the amount of data that can be generated and captured. There have been significant advances in digital acquisition and communications technologies from sensors in vehicles, rapid imagery acquisition from satellites, targeted imagery capture using cost effective drones, and automated processing and storage devices that enable large of large volumes of data to be managed effectively in cloud environments.

- **Community Participation:** Users of social media technologies are creating an ever-increasing amount of geospatial information - just by sharing a picture. This same technology is now being used in 'community science' projects to enhance government services and improve the accuracy and quality of maps. The World Wide Web, smart devices and the increase in location-based services has ushered in an era where the community are not only consumers of geospatial information, but also producers of enriched geospatial data. This affords a significant opportunity for [Country] to enhance its data infrastructure to engage the public to produce, distribute and consume geospatial information.
- **Common APIs:** Application Programming Interfaces (APIs) are making it possible to leverage geospatial data more readily to solve today's problems. Many countries have recently developed health-related Apps to better manage the COVID-19 pandemic. Community tracing, quarantine surveillance, dashboards and system enhancements have been developed at a rapid rate by countries where the NSDI has been implemented. Many of the Apps have been created by individuals, such as university students, by businesses, and through Public-Private Partnerships (PPPs).
- **Innovation Hubs and Centre of Excellence:** From mobile innovation to big data and artificial intelligence – technology today is enabling more personalized experiences for consumers of location-based products and services. Digital and mobile innovations have created new opportunities for businesses to get closer to their customers, and create more convenient, secure and engaging touchpoints between businesses and their customers. With innovation spurred initiatives such as innovation hubs and centers of excellence, [Country] can stimulate a fast-paced spatial marketplace and invigorate the economy through the development of location-based services.

5.4 Guiding Principles

The Action Plan conforms with the principles of the IGIF, which are the compass for implementation, but allow for methods to be tailored to individual country needs and circumstances. Adherence to these principles will deliver consistent geospatial information management, resulting in more open, accountable, responsive, and efficient government. These principles are as follows:

PRINCIPLE 1: Strategic Enablement

The implementation of the Framework requires political and financial support, and should therefore align with and support government's strategic direction on issues such as economic growth, social well-being, job creation, natural resource monitoring, and environmental management and preservation.

PRINCIPLE 2: Transparent and Accountable

Government geospatial information is developed and shared according to key accountability and transparency guidelines so that all citizens, government agencies, academia and the private sector have access to this valuable and underpinning national resource.

PRINCIPLE 3: Reliable, Accessible and Easily Used

Geospatial information is reliable, and made accessible and usable so that it can be leveraged for research and development, used to stimulate innovation, and support the creation of sustainable services and products to advance social, economic and environmental development.

PRINCIPLE 4: Collaboration and Cooperation

Collaboration and cooperation (between government, business, academia, civil society and donors) are factored into the implementation of the Framework to strengthen information sharing between providers and users, reduce duplication of effort across the government sector, make for a robust system, as well as providing clarity on roles and responsibilities.

PRINCIPLE 5: Integrative Solution

The implementation of the Framework is to be integrative in nature – and consider how people, organisations, systems, and legal and policy structures work together to form an effective system for managing geospatial information and its use.

PRINCIPLE 6: Sustainable and Valued

The implementation of the Framework will be conducted in such a way that it enhances national efficiency and productivity; is sustainable in the long term; and is deployed in a way that provides improved government services to citizens.

PRINCIPLE 7: Leadership and Commitment

Importantly, the implementation of the Framework will require strong leadership and commitment, often at the highest level, to enhance the long-term value of investments in geospatial information. This will be achieved through careful analysis, prioritization and sequencing to develop an action plan that carefully applies interventions in the short, medium and long term, and that can receive high level endorsement and support by government.

5.5 Benefits

Add commentary on the benefits. For example.

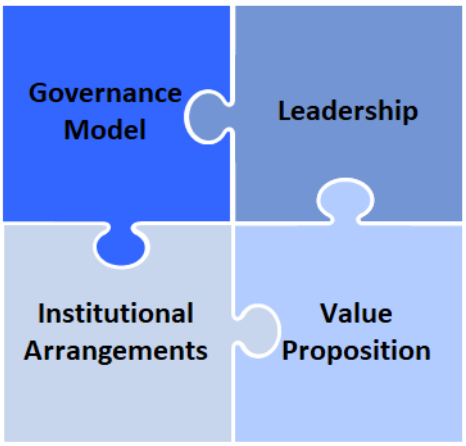
This might be characterized as "what success will look like". Positive impacts are expected in many parts of the [Country] economy, including:

- Creating new job opportunities particularly in the ICT sector but also in real estate, retail and financial services.
- Improved public sector efficiency – of institutions responsible for land administration, property taxation, spatial planning, transport and agriculture.
- Citizen benefits – through increased efficiency in road navigation, emergency services dispatch and improved interactions with the public sector, particularly in respect to land transactions and property taxation.
- Greater private sector investment – particularly in stimulating the land market and facilitating infrastructure development.
- Adapting to climate change through reductions in carbon emissions from vehicles, improving flood risk assessment and resilience to disasters.

6. ACTION PLAN

This section sets out the proposed plan and is the "heart" of the document. It is arranged according to the nine strategic pathways of the IGIF - Governance and Institutions, Policy and Legal, Financial, Data, Innovation, Standards, Partnerships, Capacity Building and Communication and Engagement.

6.1 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.*

6.1.1 Outline of Current Situation

Add commentary on the current situation in relation to Governance and Institutions.

6.1.2 Approach to Strengthening Governance and Institutional Arrangements

This section is standard text that can be adopted.

The approach for establishing good governance and strong institutional arrangements in [Country] is centered on achieving four key elements. When combined, these elements will deliver a cooperative data sharing environment for [Country], and a heightened awareness of the value of geospatial information for decision-making across all stakeholder groups. These four elements are:

- **Governance Model:** The governance model (also referred to as a governance framework) is the operating structure of the NSDI. It reflects the interrelated relationships between institutions and their roles and responsibilities with respect to geospatial information management, the flow of geospatial information, and other influences upon institutions and stakeholders, such as policies and standards. The governance model delineates the governing roles necessary to operationalize and

manage the NSDI. It includes a set of rules, procedures and other informational guidelines that define, guide and provide for enforcement for NSDI processes. The governance model is shaped by the NSDI goals, strategic mandates, financial incentives and established structures of government.

- **Institutional Arrangements:** 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 in the NSDI. 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. The governance model is supported by policies and legal mechanisms to strengthen institutional arrangements.
- **Leadership:** Leadership is realized by implementing the actions identified in the National Geospatial Strategy. The strategy clearly describes the country's strategic priorities and how geospatial information can be applied to address these priorities. In addition to having a strategy, it is important to identify a *champion* (in government) to actively lead, engage and promote the strengthening of geospatial information management and sharing across government organizations.
- **Value Proposition:** 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 is key to achieving political buy-in and financial support.

These elements are realized by implementing the actions in this Action Plan. The actions are described below in section 6.1.3.

6.1.3 Actions for Strengthening Governance and Institutional Arrangements

Governance and institutional arrangements and cross-sector information sharing culture are to be strengthened in [Country] through the following actions: List and describe actions that will deliver on the objective of the Governance and Institutions Strategic Pathway. For example:

Action 1.1 Establish NSDI Committee – *in progress*

[Country] requires a high-level body to provide leadership and direction for strengthening geospatial information management, and the implementation and ongoing operations and management of the NSDI for the benefit of all citizens, businesses and Government.

The Cabinet Secretary established an interim Task Force 167 to oversee development of the NSDI. This Task Force is chaired at Ministerial level and made up of representatives from Ministries that have an interest in geospatial information either as a producer and/or substantial user. The overall objective for this executive body is to provide strategic direction in the implementation of the NSDI.

The Ministry of Construction and Urban Development is currently finalizing the Draft SDI Act, which decrees the establishment of the NSDI Committee.

Task Outline

The following responsibilities are allocated to the NSDI Committee:

- Define roles and responsibilities and code of conduct.
- Appoint delegates.
- Endorse Action Plan.
- Prioritize development and negotiation of Investment Proposals.
- Oversee implementation progress.
- Deal with conflicts escalated for decision.
- Provide direction where change to the program is required.

6.1.4 Key Performance Indicators

The following key deliverables, evidence of achievement and milestones represent the key performance indicators of the Country Action Plan (Table 1)

Table 1 Key Performance Indicators for Governance and Institutions

Key Deliverable	Evidence of Achievement	Milestone
Fully operational National Committee on SDI	Clear Terms of Reference, defined roles and responsibilities and code of conduct, endorsed by parliament.	Year 1 Quarter 2

6.2 Policy and Legal

*This **strategic pathway** establishes a robust policy and legal framework that is essential for instituting effective, efficient and secure management and exchange of geospatial information - nationally and sub-nationally.*

*The **objective** is to address current policy and legal issues by improving the policies and laws associated with, and having an impact on, geospatial information management. This is achieved by proactively monitoring the policy and legal environment, including mandating responsibility for the production of data, and keeping abreast of issues and challenges arising from the evolving, innovative and creative use of geospatial information and emerging technologies.*

6.2.1 Overview of Current Situation

Add commentary on the current situation in relation to Policy and Legal.

6.2.2 Approach to Strengthening the Policy and Legal Framework

This section is standard text that can be adopted.

The approach for establishing a robust Policy and Legal Framework is centered on achieving four key elements. When combined, these elements will deliver a cooperative data sharing environment for [County], and a heightened awareness across all stakeholder groups of the value of geospatial information for decision-making. These elements are:

- **Legislation:** Legislation and regulations (i.e., laws or decrees) provide the legal framework in which the geospatial policies must operate. In [Country], these laws and regulations may be specific to geospatial information (e.g., legislation on geospatial data sharing) or closely related (e.g., Cyber Information Security).
- **Policies, Norms and Guides:** Policies, Norms and Guides are non-binding provisions that may or may not be enforceable under law. Policies, norms and guides play an important role in the utilization of geospatial information in a country.
- **Data Protection, Licensing and Sharing:** Data protection, licensing and sharing, data protection and privacy, and intellectual property rights impact the flow of geospatial information. These agreements/policies/schedules are sometimes addressed as part

of the broader government Policy and Legal framework, but need revision to include geospatial information.

- **Governance and Accountability:** Firstly, in order to strengthen integrated geospatial information management, there is a need for good governance and accountability to lead the development and implementation of policy and laws to address the issues that are impacting on geospatial information management. Secondly, the policies and laws in themselves, provide governance and accountability mechanisms for strengthening integrated information management. These aspects work together and neither can survive in isolation – policies are not enabled without good leadership, and leadership is strengthened through sound policies and laws.

6.2.3 Actions for Strengthening the Policy and Legal Framework

The [Country] Policy and Legal Framework, related to geospatial information management, access and use, can be strengthened through the following actions:

List and describe actions that will deliver on the objective of the Policy and Legal Strategic Pathway. For example:

Action 2.1 Establish NSDI Policy and Legal Framework

Task Outline

[Country] requires a cohesive NSDI Policy and Legal Framework for geospatial information collection, management, distribution and use. The framework typically includes policies and laws associated with the geospatial information lifecycle, technology, governance and accountability, and strategic documents that frame the environment for laws and policy setting. The framework includes processes for managing policies and laws, such as compliance mechanisms and review activities, which are to keep abreast of evolving technologies and societal demands such as surveillance drones and location tracking services to manage the spread of disease. An example Policy and Legal Framework is provided in Figure 8.

Geospatial Information 'Lifecycle' Policies	Technology	Governance and Accountability	Strategic Alignment	Laws and Regulations
• Data Sharing • Data Custodianship (Acquisition and Management • Data Classification • Intellectual Property Management • Data Access/Release • Licensing and Pricing Framework • Policy Tools: Roles and Responsibilities, Mandates, Guidelines, Procedures, Checklists	• Cybersecurity • Business and Digital Continuity • Data Security (transmittal and Storage) • ICT Standards • Data Exchange Protocols • Data Standards • Records Management (Retention/Disposal)	• Policy Register • Communication Strategy • Compliance Strategy and Audit • Policy Review and Impact Assessment • Economic Incentives e.g. payment credits to incentivize policy outcomes • Data Integrity and Risk Management Reporting	• NSDI Strategy • Government Digital Transformation Strategy • Open Data Initiative • MOUs • Other government Strategies	• NSDI Act • Data collection e.g. Surveying Act, CASA Drone Regulations, Competitive Neutrality, Privacy • Data management and access e.g. FOI, Data Protection, Data • Related Laws Environment, Heritage, Mining, Biodiversity, Land etc • Executive Orders

Figure 8 Policy and Legal Framework Example

6.2.4 Key Performance Indicators

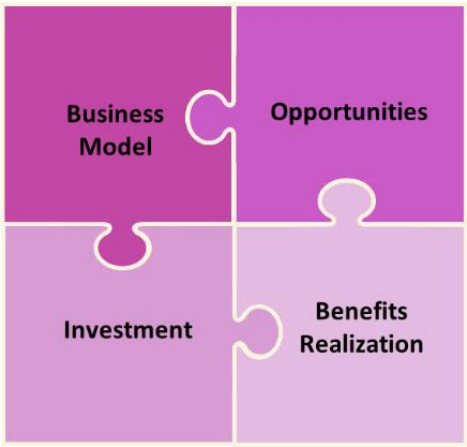
List the key deliverables. For example:

The following key deliverables, evidence of achievement and milestones represent the key performance indicators of the Country Action Plan (Table 2)

Table 2 Key Performance Indicators for Policy and Legal

Key Deliverable	Evidence of Achievement	Milestone
A Policy and Legal Framework is completed	A Policy and Legal Framework that supports cohesiveness and coherence in legislation and policies for integrated geospatial information management	Year 2 Quarter 4

6.3 Financial



*This **strategic pathway** establishes the business model, develops financial partnerships, and identifies the investment needs and means of financing 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 financial plans required to establish and maintain an integrated geospatial information management system, as well as the longer-term investment program that enables government to respond to evolving societal, environmental and economic demands for geospatial data.*

6.3.1 Overview of Current Situation

Add commentary on the current situation in relation to Financial.

6.3.2 Approach to Strengthening the Policy and Legal Framework

This section is standard text that can be adopted.

The approach for establishing a sustainable investment framework for integrated geospatial information management is centered on achieving four key elements. When combined, these elements will achieve a national business model for integrated geospatial information management and an understanding of the implementation costs and ongoing financial commitment necessary to sustain and maintain geospatial information management in the longer term. These elements are:

- **Business Model:** A business model and plan for the successful operation of the NSDI that identifies the sources of revenue, products and services to be offered, the intended customer base and details of financing. The business model is underpinned by a series of value propositions. The adopted model is to be compatible with [Country's] fiscal and funding capabilities and facilitates the wider use of geospatial data across government and/or by the private sector.
- **Opportunities:** Rapid advances in technology are presenting a wider range of opportunities for the application of geospatial information across many use cases in many disciplines and economic sectors. Understanding these opportunities, far too many for any nation to pursue at one time, is also a challenge. As a consequence, there

is a need to align geospatial use cases with national policy objectives in order to prioritize potential investments.

- **Investment:** There are range of possible financing arrangements to be considered, such as government funding provided from general taxation, supplemented by loans or grants from international financing institutions, and Public-Private Partnerships that are increasingly an important part of the development of business cases to stimulate and grow integrated geospatial information management, access and use.
- **Benefits Realization:** Identifying benefits that can be reliably measured after delivering the Action Plan are important. Establishing the key performance indicators that will form the subsequent basis for evaluation and quantification needs to be established prior to implementation, but the flexibility to change as the Action Plan objectives and opportunities evolve over time is also required.

6.3.3 Actions for Strengthening and Sustaining Geospatial Investments

The [Country] NSDI Financial Framework will need to be formulated to stimulate a well-developed geospatial economy with a vibrant geospatial product and services market. Such a sustainable business model can be achieved through the following actions:

List and describe actions that will deliver on the objective of the Financial Strategic Pathway. For example:

Action 3.1 Establish NSDI Financial Program Management and Leadership

Task Outline

There is a need to establish the leadership and governance roles for NSDI investment planning and monitoring, as well as the initial work to establish a workable and sustainable business model. The following roles are required:

- The NSDI Committee will have responsibility for the investment plan and the sustainability of the NSDI business model in the longer term.
- The day-to-day management of the NSDI Investment plan will be responsibility of the NSDI Program Office.
- The NSDI Program Office will require a suitably qualified Financial Manager with accountancy qualifications and significant experience in delivering business models, cases and plans.
- The Financial Manager will report directly to the Head of the NSDI Program Office and NSDI Committee.

6.3.4 Key Performance Indicators

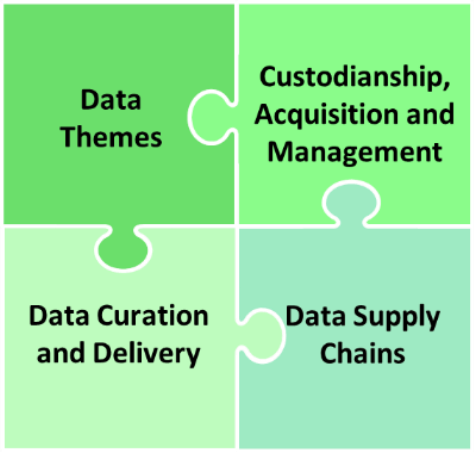
List the key deliverables. For example:

The following key deliverables, evidence of achievement and milestones represent the key performance indicators of the Country Action Plan (Table 3)

Table 3 Key Performance Indicators for Financial

Key Deliverables	Evidence of Achievement	Milestone Date
NSDI Financial Program Management and Leadership Established	Financial manager appointed within program management group	Year 1 Quarter 2

6.4 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.*

6.4.1 Overview of Current Situation

Add commentary on the current situation in relation to Data and discuss each of the themes. For example:

6.4.2 Approach to Strengthening the NSDI Data Management Framework

This section is standard text that can be adopted.

The approach for promoting consistent data management, sharing and reuse is centered on achieving four key elements. When combined, these elements will enable data custodians to meet their obligations to government and the user community through strengthening the management of geospatial information management. These elements are:

- **Data Themes:** Data Themes are to be established to organize national fundamental datasets that are relevant to a broad range of applications which are a priority for government, private sector and the community. Data themes can include application data themes that are captured for a specific purpose, such as health and utilities; and socio-economic themes that are used for demographic studies
- **Custodianship, Acquisition and Management:** Data Custodianship is an imperative as it leads to the responsible collection, management, maintenance and dissemination of fit-for-purpose geospatial information. Data custodianship is to be assigned to a department in order to mandate certain rights and responsibilities for the collection of geospatial information and the management of this information on behalf of the community. The rights and responsibilities may include the right to set conditions for

data release and responsibilities for the acquisition, management, maintenance and quality of the information.

- **Data Supply Chains:** A data supply chain refers to the flow of geospatial information from one organization to another, such as from a Land Administration Agency to a municipal council and vice versa. Each organization in the supply chain will typically add value, such as updates, to the data before transferring the information on to the next organization. These types and interlinkages support cooperative data sharing and integration, and need to be formalized so that locally (provincial) gathered information can be transferred to National databases, and information collected by departments at the same government level can be seamlessly integrated.
- **Data Curation and Delivery:** Data curation and delivery refers to the art of maintaining the value of data and delivering it to end users in a way it can be visualized and used. The main purpose of data curation is to ensure that data is reusable for future purposes. Data curation needs to be assigned to a data curator agency (or aggregator) who is responsible for collecting data from many different sources and then aggregating and integrating the data into an information resource, such as national map portal. This is a crucial NSDI requirement. Data curation is essential for readying unified datasets for analysis and decision-making.

6.4.3 Actions for Strengthening the Data Management Framework

List and describe actions that will deliver on the objective of the Data Strategic Pathway. For example:

Action 4.1 Establish Data Framework – *in progress*

The Data Framework is essentially a register of all geospatial information (including metadata catalogues) that forms part of the NSDI. The Data Framework is used to communicate what information is available to users and the broader stakeholder group.

Task Outline

In developing the Data Framework, the following tasks are to be undertaken:

- Formalize data themes (categories) as specified in the strategy as foundation spatial data themes.
- Conduct a data inventory and categorize each dataset according to the formalized data themes.
- For each dataset complete a data set profile inclusive of:

Data custodian (and data curator agency where applicable).

- How the dataset can be accessed and used, and whether or not it is openly available, for government use only, confidential or restricted.
- Licensing category and type.
- Data characteristics, such as the data structure, accuracy, coverage and update frequency for each dataset so that users can make a judgement on its suitability to their purpose.
- The data and information standards/technical specifications used to create/acquire the data (Also see Action 6.1 under the Standards Pathway).

6.4.4 Key Performance Indicators

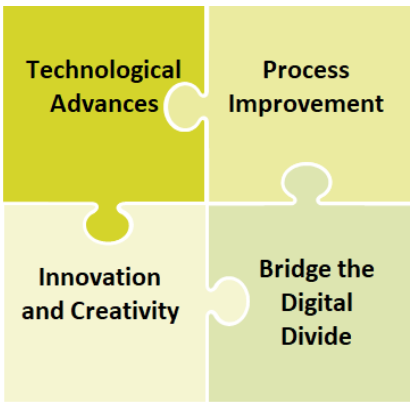
List the key deliverables. For example:

The following key deliverables, evidence of achievement and milestones on the highest priority tasks represent the key performance indicators of the Country Action Plan (Table 4)

Table 4 Key Performance Indicators for Data

Milestone	Evidence of Achievement	Expected Achievement Date
A Data Framework that is nationally recognized and adopted	All departments that collect geospatial-related information have their datasets registered in the National Data Framework	Year 1 Quarter 4

6.5 Innovation



*This **strategic pathway** recognizes that innovation has the potential to stimulate, trigger and respond to rapid change, leapfrog outdated technologies and processes, and to bridge the geospatial digital divide. Technology is continually evolving, creating new opportunities for innovation and creativity.*

*The **objective** is to leverage the latest cost-effective technologies, innovations and process improvements so that governments, businesses and academia, no matter their current situation, may leapfrog to modern geospatial information management systems and practices.*

6.5.1 Overview of Current Situation

Add commentary on the current situation in relation to Innovation.

6.5.2 Approach to Stimulating Innovation in Geospatial Information Management

This section is standard text that can be adopted.

The approach to stimulating the use of the latest technologies, process improvements and innovation is centered on achieving four key elements. When combined, these elements will enable [Country] to adopt state-of-the-art geospatial information management systems and practices and in doing so quickly bridge the geospatial digital divide. These elements are:

- **Technological Advances:** Spatial Data Infrastructures today are being influenced by a new industrial paradigm – Industry 4.0, where individualized production, horizontal integration in collaborative networks and digital integration of supply chains are emerging. As [Country] embarks on its NSDI journey there are now new ways to produce and distribute information products. There is an opportunity for the Government of [Country] to leapfrog its neighbors in NSDI functionality by developing data access portals.

- **Process Improvement:** Process Improvement is the proactive task of identifying, analyzing and improving upon existing processes and standards of quality. It involves a systematic approach and specific methodology. Process improvement can be achieved through small achievable incremental steps or bold leaps forward using different technologies to achieve productivity gains through more streamlined capabilities.

- **Innovation and Creativity:** Innovation models and policy instruments are required for targeting investments in science and technology to generate economic growth as well as innovation for social, economic and environmental sustainability. There are several

methods that the Government of [Country] can implement to stimulate innovation and creativity.

- **Bridging the Digital Divide:** In [Country] the geospatial digital divide is exacerbated by the lack of awareness and understanding of the role of geospatial information and enabling technologies at the policy and decision-making levels. There is a need to extend capabilities well beyond just having access to computers, the Internet and new and innovative technologies, and consider non-traditional data sources such as high frequency satellite data, crowdsourced data, big data analysis and machine learning, to accelerate data collection and curation.

6.5.3 Actions for Stimulating Innovation in Geospatial Information Management

A [Country] NSDI Innovation Framework is required to stimulate the use of the latest technologies, process improvements and innovation so that government may leapfrog to state-of-the-art geospatial information management systems and practices. The NSDI Innovation Framework will be achieved through the following actions:

List and describe actions that will deliver on the objective of the Innovation Strategic Pathway. For example:

Action 5.1 Develop National Geoportal

Task Outline

Current Situation

There is no single view of the availability of geospatial data (in both digital and paper form) for [Country]. There are partial inventories, one under development within the Land Administration Agency, two in the Mineral Resources and Petroleum Authority , another in the Ministry of the Environment and we have been made aware, but not validated, the existence of others. These are not in a common format and are not, we believe, interoperable. Other significant sources of geospatial data have also been uncovered as a result of this study.

One direct consequence, we have observed is the duplication of data acquisition and maintenance across different government and private organizations. This leads to confusion amongst the relatively few users who are currently aware of these resources. There is also competition and mistrust between those that run these geoportals.

The need for a single discovery meta-database[19] that can be freely accessed to find what geospatial data exists, and how and where to obtain access to it, would overcome this issue and be a “quick win” for the NSDI initiative being a visible and valuable signal of intent. Further, it would underscore the collaborative nature of the NSDI, by not seeking to create a

[19] Repository of data about data, such as the extent of coverage, currency and URL for access to the data itself.

centralized system but a distributed approach, allowing individual departments to contribute without fear of losing ownership and control of their core data assets.

The architecture envisaged for such a system is illustrated in **Error! Reference source not found.**National Geoportal.

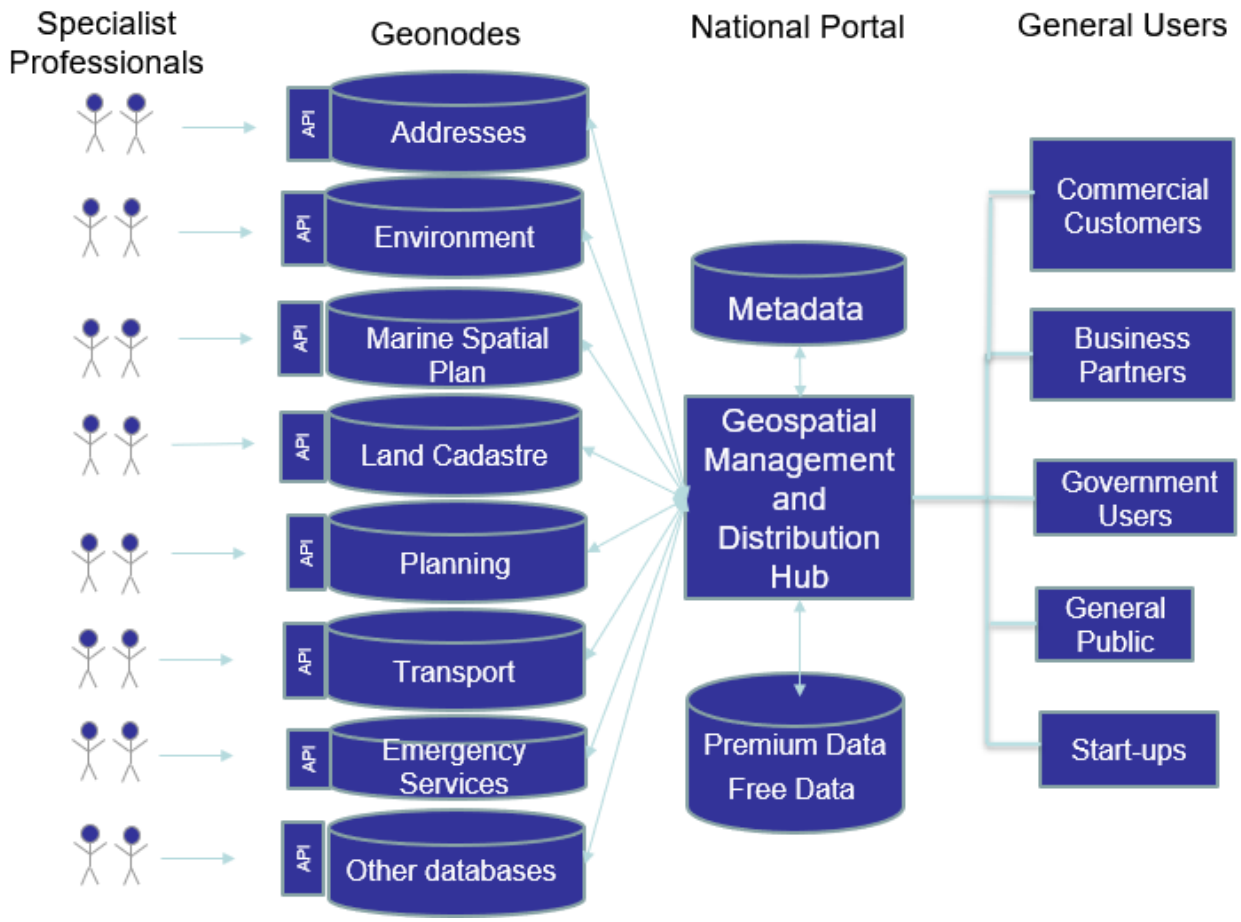


Figure 9 Conceptual Model – National Geoportal

Task Outline

To implement a National Geoportal the following initial activities will be required:

- Collate existing inventories and extend to cover all known sources of foundation data themes.
- Structure these data into a standard metadata format. A profile for [Country] based on the ISO 19115 international standard could be readily adopted with little need for change.
- Circulate inventory to stakeholders for feedback and correction of their entries.
- Design and implement a meta-database to store and curate the inventory. As there are a number of existing systems, they should be evaluated to decide which can be most cost-effectively upgraded and future proofed.
- Disseminate the purpose and value widely within public and private sectors, refer to the Strategic Pathway on Communications.

- Implement an effective maintenance regime – most discovery meta-databases are created successfully but fail because the data they contain is not updated.

6.5.4 Key Performance Indicators

List the key deliverables. For example:

The following key deliverables, evidence of achievement and milestones represent the key performance indicators of the Country Action Plan (Table 5)

Table 5 Key Performance Indicators for Innovation

Milestone	Evidence of Achievement	Expected Achievement Date
A National Geoportal is operational	The National Geoportal contains fundamental Data Themes and standard metadata profiles and is operational and maintained.	Year 3 Quarter 4

6.6 Standards

*This **strategic pathway** establishes and ensures the adoption of best practice standards and compliance mechanisms for enabling data and technology interoperability to deliver integrated geospatial information and location-based knowledge creation.*

*The **objective** is to enable an efficient and consistent approach for different information systems to be able to discover, manage, communicate, exchange and apply geospatial information for a multitude of uses, improved understanding and decision-making.*

6.6.1 Overview of Current Situation

Add commentary on the current situation in relation to Standards.

6.6.2 Approach to Strengthening the Standards Framework

This section is standard text that can be adopted.

The approach to establishing best practice standards and compliance mechanisms is centered on achieving four key elements. When combined, these elements will enable [Country] to integrate different information systems to discover, manage, communicate, exchange and apply geospatial information for a multitude of uses, including improved decision making. These elements are:

- **Standards Governance and Policy:** Ensures that the benefits of standards can be maximized through coordinated governance and coherent policies. Standards are a key component of geospatial policy and governance at the national level. Nationwide success in standards requires an efficient governance model inclusive of relevant stakeholders, and a commitment to assess, establish, and maintain a common standards framework. Establishment of a policy environment supportive of advancing a common standards framework is also paramount to [Country's] success. A clear leadership commitment and structure are also key.
- **Technology and Data Interoperability**: Enables different technologies, systems, and geospatial data to work together seamlessly, and provides the flexibility to rapidly mobilize newer technologies and data sources. Geospatial data standards provide a digital encoding to locate and describe the features and conditions that are on, above or below the Earth's land and ocean surface. Technology standards, such as for API's, are used to specify how software components interact with each other through standard interfaces to enable different systems and services to work together. Data

and Technology Standards support the *Semantic Interoperability* necessary to "mediate" these differences to produce a common meaning. Data, technology and semantic interoperability are key elements of the NSDI in [Country].

- **Community of Practice:** A group of people who share skills, knowledge and experiences about the implementation of standards. The group often leverages formal and informal partnerships and agreements to share and adopt community standards best practices. In [Country], a community of practice will build on existing efforts, and support training and development in standards, which is currently required.
- **Compliance Testing and Certification:** Leverages testing, measurement and certification processes to assure proper implementation of standards. A system of compliance is used to ensure that organizations are implementing the nationally or internationally endorsed standards that promote data sharing and use, and to verify that technology products and services acquired by government properly implement the required standards. There are several levels of standards compliance that should be considered by [Country] including regular assessments, government mandates, and testing and certification functions.

6.6.3 Actions for Strengthening the Standards Framework

In [Country], a Data and Technology Standards Framework is part of the critical architecture by which data can be discovered, collected, published, shared, stored, combined, and applied. The Framework will be achieved through the following actions:

List and describe actions that will deliver on the objective of the Standards Strategic Pathway. For example:

Action 6.1 Conduct a Needs Assessment into Data and Technology Standards

Current Situation

There exists a NSDI Standards Working Group with the responsibility to address cross-government needs for data and technology standards. The roles and responsibilities of this working group need to be expanded to include the development of policies and procedures that promote the procurement, implementation and use of standards-based technologies and data to streamline data access and sharing.

A critical task for this working group is to establish and maintain a process to review, assess, develop, evaluate and endorse national standards for geospatial information management.

A private software company manages the enterprise architecture for government. The representation of this company on the working group is important because there is a need to bring together standards developed around government administration data with geospatial

standards that are relevant to land – thus enhancing administrative data with location information.

Task Outline

- Review how geospatial and technology standards are applied across the government sector.
- Conduct an inventory of all the data standards currently in use including data models, vocabularies, metadata, systems and application standards. This can be done at the same time as the Data Inventory (See Action 4.1).
- Identify what key functions are required including: (a) sharing maps/geospatial data across networks within an organization or on the web; (b) institute a better cataloging system to track physical maps, support multi-jurisdictional geospatial data collection and maintenance; and (c) support cooperative geospatial activities with neighboring nations.
- Conduct a gap analysis to identify the current and future requirements of standards with respect to achieving key functions that will deliver on NSDI goals. This includes:
    - Identify what standards are missing and need to be established.
    - What international standards can be adopted or adapted to serve each key function. i.e., data quality, data structures, data formats.
- Conduct broad public/private sector stakeholder consultation to raise awareness and to promote the alignment of a common Standards Framework across the nation.
- Review Standards with stakeholders and incorporate feedback into the Standards Framework, where appropriate.

6.6.4 Key Performance Indicators

List the key deliverables. For example:

The following key deliverables, evidence of achievement and milestones represent the key performance indicators of the Country Action Plan (Table 6)

Table 6 Key Performance Indicators for Standards

Milestone	Evidence of Achievement	Expected Achievement Date
Needs Assessment into Data and Technology Standards completed	Standards Review Document Inventory of standards in use and Gap Analysis Stakeholder communications relating to standards and stakeholder feedback.	Year 2 Quarter 4

6.7 Partnerships

*This **strategic pathway** establishes cross-sector and interdisciplinary cooperation, coordination and collaboration with all levels of government, the geospatial industry, private sector, academia and the international community, as an important premise to developing and sustaining an enduring nationally integrated geospatial information framework.*

*The **objective** is to create and sustain the value of geospatial information through a culture based on inclusion, trusted partnerships and strategic alliances that recognize common needs, aspirations and goals, towards achieving national priorities and outcomes.*

6.7.1 Overview of Current Situation

Add commentary on the current situation in relation to Standards.

6.7.2 Approach to Strengthening Partnerships

This section is standard text that can be adopted.

Establishing a NSDI Partnership Framework is required to create and sustain the value of geospatial information in [Country]. This Framework is centered on achieving four key elements. When combined, these elements will deliver effective cross-sector and interdisciplinary cooperation, industry partnerships, community participation and international cooperation. These elements are:

- **Cross-sector and Interdisciplinary Cooperation:** In [Country], cross-sector and interdisciplinary cooperation can take on many forms, from simple networking where information is shared for mutual benefit, to more structured coordination and collaboration where organizations may have to alter their data management processes and protocols and agree to share data, resources and systems for a common purpose. In many cases, cooperation will require enhancing the capacity of partner organizations for mutual benefit. Investment may take the form independent co-funding by each organization, or contributions to a common pool or resources.
- **Private Sector and Academia Collaboration:** Strategic partnerships and joint ventures with the private sector, the broader geospatial industry and companies, and educational and research institutions facilitate and support win-win collaborative outcomes for government and stakeholders through local, national and international

collaborative activities or ventures and sector-specific strategic initiatives, such as infrastructure development. These strategic partnerships have potential to provide the Government of [Country] with significant positive benefits as well as to the community of users.

- **Community Participation:** Community participation is about seeking involvement from individuals and community groups in geospatial information projects. Community partnerships offer significant advantages for data collection and problem solving at the local level. Community participation can take on a variety of forms, such as map-a-thons for collecting geospatial information to support emergency management efforts.
- **International Collaboration:** International cooperation is crucially important to delivering on sustainable development goals. Geography has no real boundaries and transboundary issues exist. Cross border cooperation amongst regional actors can foster coordinated decisions and actions that enable robust results and change. The Government of [Country] has the opportunity to develop geospatial information-related partnerships that contribute to resolving global issues.

6.7.3 Actions for Strengthening Partnerships

The [Country] NSDI Partnership Framework will need to foster cross-sector and interdisciplinary cooperation, coordination and collaboration with all levels of government, the geospatial industry, private sector, academia and the international community. The Partnership Framework can be achieved through the following actions:

List and describe actions that will deliver on the objective of the Partnerships Strategic Pathway. For example:

Action: 7.1 Strengthen and Formalize Partnerships within [Country]

Task Outline

Partnerships are about addressing a need or gap in capability or possibly pooling resources to increase capabilities. The following activities will increase the potential for NSDI-related partnerships to be established and thrive:

- Cross agency partnership arrangements to encourage information sharing: There are many potential cross agency partnerships that can be developed to facilitate data sharing. Historically, data sharing partnerships have been difficult to implement and maintain. Rather than trying to establish many partnerships at one time, the approach will be to select an appropriate partnership candidate and pilot the partnership process.
- Identify a relatively low profile Public Private Partnership to increase the number and scope of location products and services in the market place. The private sector is

known to have adopted geospatial technologies in their products and services. However, anecdotally the private sector can play a much larger role in using and contributing to the success of the industry on a national scale.

- Establish Partnerships with the Academic Sector to enable research and development initiatives to address strategic country priorities.
- Create community participation opportunities (crowdsourcing) to raise awareness of the importance of geospatial information for government services and policy setting. The local knowledge of community groups, citizen volunteers, and non-profit service organizations can be leveraged to collect geospatial information in their local areas. A candidate project is the Geographical Names Register, where community Apps can be used to record and validate names of local landmarks so that they can be made official.

6.7.4 Key Performance Indicators

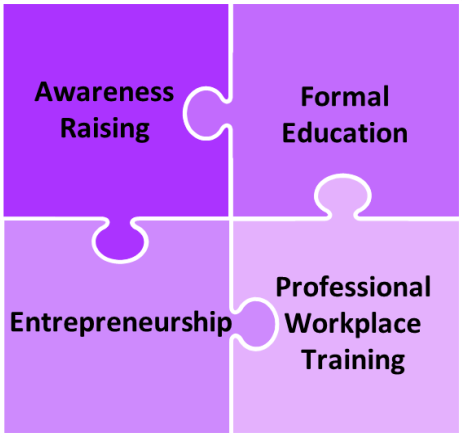
List the key deliverables. For example:

The following key deliverables, evidence of achievement and milestones represent the key performance indicators of the Country Action Plan (Table 7).

Table 7 Key Performance Indicators for Partnerships

Milestone	Evidence of Achievement	Expected Achievement Date
Partnerships within [Country] are strengthened and formalized	An increase the number and scope of location products and services in the marketplace achieved through Public Private Partnerships	Year 2 Quarter 4

6.8 Capacity and Education



*This **strategic pathway** establishes enduring capacity development and education programs so that the value and benefits of integrated geospatial information management is sustained for the longer term.*

*The **objective** is to raise awareness, build and strengthen knowledge, competencies, skills, instincts, processes, resources and innovative entrepreneurship that organizations, communities and individuals require to utilize geospatial information for evidence based decision-making and effective service delivery.*

6.8.1. Overview of current situation

Add commentary on the current situation in relation to Capacity and Education.

6.8.2 Approach to Establishing the Capacity Building and Education Program

This section is standard text that can be adopted.

The approach for establishing enduring capacity building programs and education systems is centered on achieving four key elements. When combined, these elements raise awareness and develop and strengthen the skills, instincts, abilities, processes and resources that departments require to manage and utilize geospatial information for decision-making. These elements are:

- **Awareness Raising:** Awareness raising is achieved formally through education and training programs and informally through observation and hands-on experiences. Leadership is a key ingredient for effective awareness raising. In [Country], the leadership team are familiar with the value and benefits of geospatial information; and are influencing, inspiring and motivating others to respond to the changes needed to strengthen capability.
- **Formal Education:** Formal education programs are delivered by trained teachers in a systematic intentional way within a school, higher education institution or university. Investing in technical and tertiary education has significant impact on national capacities. Evidence from other counties, suggests that if [Country] invests in their post-secondary education systems, they will develop and sustain GIS and NSDI capabilities and capacity over a longer period of time.

- **Entrepreneurship:** Entrepreneurs design, launch and run new business ventures and are critical to vibrant and growing economies. Governments can support and stimulate entrepreneurship through innovation programs that grow the capabilities of the business sector to develop products and services that are underpinned by geospatial information. This support is important. In [Country], entrepreneurs are often exposed to risks and inclined not to bring new ideas to market; and yet, they create business opportunities and advance society, while solving human problems.
- **Professional Workplace Training:** Skills and knowledge can be developed and shared within an organization, such as through on-the-job training, study tours and fellowship programs. For [Country], being able to observe and apply new methods and gain practical experiences will have significant benefits, not just because of the new knowledge and skills learned, but also because of the opportunity to develop professional networks and mentorship.

6.8.3 Actions for Establishing the Capacity Building and Education Program

List and describe actions that will deliver on the objective of the Capacity and Education Strategic Pathway. For example:

The [Country] NSDI Capacity Building and Education Program will need to be formulated to raise awareness and develop and strengthen the skills, instincts, abilities, processes and resources that departments require to manage and utilize geospatial information. The Capacity Building and Education Framework can be achieved through the following actions:

Action 8.1 Develop an NSDI Capacity Building and Education Strategy

The Capacity Building and Education Strategy provides justification for the need to enhance the knowledge and skills in geospatial information management and more broadly, the operational aspects of maintaining a spatial data infrastructure. This will be overseen by the NSDI Working Group on Capacity Building and Education.

Task Outline

The Strategy will include the following components:

- Identification of relevant skills that are needed to deliver actions within the Action Plan and provide for the optimum long-term sustainable use of geospatial information.
- Definition of target groups for capacity building and engagement programs, including the recognition of any gender or other cross-cutting issues. This will include strengthening tertiary education; awareness at primary and secondary school level but not just within the science curriculum; and citizen awareness raising.

- Build a roadmap of specific activities (sometimes referred to as interventions) that will address gaps in capability and overcome barriers to change.
- Measuring outcomes and impact of capacity building, and education programs. This will inform their further development and refinement throughout the implementation NSDI and in the future.

6.8.4 Key Performance Indicators

List the key deliverables. For example:

The following key deliverables, evidence of achievement and milestones represent the key performance indicators of the Country Action Plan (Table 8)

Table 8 Key Performance Indicators for Capacity and Education

Milestone	Evidence of Achievement	Expected Achievement Date
NSDI Capacity Development and Education Strategy Developed	An endorsed Capacity Development and Education Strategy and road map.	Year 1 Quarter 3
NSDI Skills Gap Analysis completed	An inventory of knowledge, skills and resources completed	Year 2 Quarter 1

6.9 Communications and Engagement

*This **strategic pathway** recognizes that stakeholder identification, user engagement and strategic communication are essential to successfully deliver integrated geospatial information management arrangements nationally and sub-nationally for sustainable social, economic and environmental development.*

*The **objective** is to ensure effective communication and engagement to enhance and deepen participation and contributions from all stakeholders and at all levels. Commitment, mutual understanding, collaboration, cooperation and communication are essential to successfully implement the Integrated Geospatial Information Framework within organizations and with stakeholders.*

6.9.1 Overview of current situation

Add commentary on the current situation in relation to Communication and Engagement.

6.9.2 Approach to Establishing Communication and Engagement Framework

This section is standard text that can be adopted.

The approach for achieving effective communication and engagement to enhance and deepen participation and contributions from all stakeholders and at all levels is centered on achieving four key elements. When combined, these elements engender commitment, mutual understanding, collaboration, cooperation and communication, which are essential to successfully implementing the NSDI. These elements are:

- **Stakeholder and User Relationships:** Stakeholder and user relationships are used to identify and develop alliances with advocates, users, partners and third parties. Given the underpinning nature of integrated geospatial information management, stakeholders will be diverse, priorities will need to be set, and expectations managed. Engagement is a continuous process, as stakeholder and user interests, needs and motivations will evolve with time.
- **Strategic Messaging and Engagement:** Strategic messaging is used to develop the narrative of clear, succinct, compelling and strategic messages for all audiences to engender initial understanding and buy-in and retain support during the

implementation of the NSDI. These messages are crucial and need to be incorporated into national policies and strategies. In so doing, a national geospatial brand is developed for [Country].

- **Communication Strategy, Plans and Methods:** Communication strategies, plans and methods are used to identify and engage with stakeholders and users and to sustain communication channels and information flows. Planning and execution are critical components of effective communication strategies and plans. It takes into consideration that potential stakeholders will become active participants when they see benefits for their organization or groups and customers.
- **Monitoring and Evaluation:** A Monitoring and Evaluation Framework sets the performance measures to assess the effectiveness of the communication strategies, plans and methods. It provides the opportunity to reflect and re-think communication and engagement practices, as the plan to strengthen integrated geospatial information management is progressively delivered.

6.9.3. Actions for Establishing Communication and Engagement Framework

The [Country] Communication and Engagement framework will encourage greater input from stakeholders and users, and in doing so, achieve greater buy-in when implementing the NSDI. The Framework can be achieved through the following actions:

List and describe actions that will deliver on the objective of the Communication and Education Strategic Pathway. For example:

Action 9.1 Develop an NSDI Communication and Engagement Strategy and Plan

Task Outline

The Stakeholder Communication and Engagement Strategy and Plan lays the critical foundation for raising the profile of the NSDI across all stakeholder groups and increasing "buy-in". It identifies and prioritizes key stakeholder groups and explains the method and timetable for sharing information. The strategy also describes the resources and responsibilities for implementing the engagement activities and explains how stakeholder feedback will be managed. The strategy also details accountability and responsibility for the consultation and how the results will be captured, tracked, reported and disseminated.

The strategy will include strategic messages and establish the NSDI brand. Major tasks include:

- developing the actual stakeholder Communication and Engagement Strategy and Plan.
- Identifying the methods that will be used to communicate with the different stakeholder groups.

- Identification and analysis of stakeholders – update to the activity already documented in the geospatial alignment with government policy drivers.
- Establish a virtual library of success stories to demonstrate good practice and benefits.
- Engagement materials for departments to support their internal communications.

6.9.4 Key Performance Indicators

List the key deliverables. For example:

The following key deliverables, evidence of achievement and milestones represent the key performance indicators of the Country Action Plan (Table 9)

Table 9 Key Performance Indicators for Communication and Engagement

Milestone	Evidence of Achievement	Expected Achievement Date
NSDI Communication and Engagement Plan Approved	Stakeholder Communication and Engagement Strategy and Plan completed	Year 1 Quarter 2
Case Study Collateral	Virtual library of success stories compiled and socialized	Year 1 Quarter 2

7. IMPLEMENTATION

This section is standard text that can be adopted.

In this section, a draft program plan, suitable for use by the implementation team is set out.

7.1. Investment Plan

The table below provides both the levels of investment in the Actions detailed in the report and also the nature of the expenditure and suggested timescales for delivery. The levels of investment estimates are to be regarded as "order of magnitude" costings for each activity. They will be refined in the detailed planning stage.

Under the column headed 'Capital' or 'Recurrent', items that are one-off costs are designated Capital (C) and those that are recurrent, so needing to continue to be funded beyond the project period are designated Recurrent (R).

Under the column headed 'Funding', the following codes are used:

FA Fully Funded from State Budget.
PA Partially funded from State Budget.
NF No current source of Funding.
BAU Business as Usual.

Business as Usual actions have an investment value of zero. These are activities for which it is expected that stakeholders will contribute staff time as part of their usual activities and will not expect to recover charges from the project budget.

Depending on how these tables are viewed on screen, it may be necessary to increase the zoom factor to comfortably view them.

A separate spreadsheet, which provides more detail, is included in the package of supporting documents supplied with this report.

Table 10: Investment Plan- Governance, Policy and Law and Financial Strategic Pathway

Task Type					Financial				Timeframe							
Action Ref	Title	GGIM Strategy Pathway Type	Priority	Description	Total Investment (MNT Mn)	Total Investment (US$ Thousand)	Capital or Recurrent	Funding	Start Date	End Date	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
1.1	NSDI Committee	Governance and Institutions	High	Pinnacle body supporting NSDI development	0	0	R	BAU	1.00	1.50						
1.2A 1.5	Program and Change Management Governance Model	Governance and Institutions	High	Management of Program Office Define Governance Model	217	76	R	NF	1.00	6.00						
1.2B	NSDI Program Office	Governance and Institutions	High	Staff to support implementation	343	120	R	NF	1.00	6.00						
1.3	Working Groups	Governance and Institutions	Medium	Working Groups to guide and support implementation	0	0	R	BAU	1.50	6.00						
1.4	NSDI Advisory Board	Governance and Institutions	Medium	Advisory group to widen senior-level input beyond the core stakeholders	0	0	R	BAU	1.50	6.00						
1.6	Formulate Geospatial Value Proposition	Governance and Institutions	High	Derived from Socio-economic Impact Assessment	0	0	R	BAU	1.00	1.50						
1.7	Develop NSDI Geospatial Strategy	Governance and Institutions	Medium	Defined within Action Plan	0	0	R	BAU	1.50	2.00						
1.8	Monitoring and Evaluation Framework	Governance and Institutions	High	Define Key Performance Indicators, how they will be measured and actions required on exceptions	172	60	R	NF	1.00	6.00						
Action Ref	Title	GGIM Strategy Pathway Type		Description	Total Investment (MNT Mn)	Total Investment (US$ Thousand)	Capital or Recurrent	Funding	Start Date	End Date	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
2.1	Approval of NSDI Law	Policy and Legal	High	Revise draft law, submit to parliament and gain approval	43	15	R	NF	1.00	2.00						
2.2	NSDI Policy and Legal Framework	Policy and Legal	Very High	Policy framework to facilitate data sharing including guidelines for data release, licensing and custodianship	455	158	R	NF	1.25	1.75						
2.3	Prepare and Implement Compliance Strategy	Policy and Legal	High	Details of how to encourage / enforce compilance to laws and regulation	87	30	R	NF	2.00	4.00						
Action Ref	Title	GGIM Strategy Pathway Type	Priority	Description	Total Investment (MNT Mn)	Total Investment (US$ Thousand)	Capital or Recurrent	Funding	Start Date	End Date	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
3.1	NSDI Financial Program Management	Financial	High		109	38	R	NF	1.00	6.00						
3.2 3.3	Best Practice Investment Models and Funding Options	Financial	High		455	158	R	NF	1.00	2.00						
3.4	Develop Investment Business Cases	Financial	High	Create business cases for investments requiring external donor funding.	455	158	R	NF	2.00	3.00						

This is an example of the Investment Plan that will be copied from the Socio-economic Impact Assessment Report.

7.2. Risk Management

This section is standard text that can be adopted.

This section outlines the risks inherent in the delivery of the Action Plan and how they can be managed and mitigated.

Risk management is a complex subject and requires development of a comprehensive and constantly updated risk management plan. The Action Plan seeks only to identify the most significant risks and have mechanisms in place for their management.

Risks are usually categorized against two criteria a) probability b) impact. Those risks with high impact and high probability are considered critical and should be considered first.

The table below indicates some of the significant risks identified at this stage.

Table 11 Risk Management Strategy

Risk	Impact	Probability	Management
Lack of buy-in by stakeholders	High	Medium	Strong high-level mandate and agreed governance. Effective engagement with all stakeholder groups through an engagement strategy
Expected benefits not realized	High	Low	Tracking of measurable Key Performance Indicators and, if necessary, reallocating investment away from under-performing components
Costs overrun	High	Medium	Detailed costing of investments and strong project management
Incompatible Technologies	High	Low	Adoption of open interoperability standards, detailed technology assessment prior to implementation
Insufficient human capacity in country to deliver.	Medium	High	Mitigated in short-term by overseas consultancy support, longer term via capacity building programs (Centre of Excellence)

8. BUSINESS CASE

8.1 Introduction

This section is standard text that can be adopted.

The term business case does not have universal recognition. A business case is a written value proposition that is intended to educate a decision maker and convince them to take some type of action. It may be necessary to use alternative terminology in some countries – socio-economic justification may for instance be a useful alternative.

In summary, best practice advice[20] is to consider the business case from five separate perspectives:

Strategic case - the business need and contribution to the nation's development strategy;

Economic case - presenting the costs and benefits to show value for money;

Commercial case - how engagement or partnering with the commercial sector will be handled;

Financial case – affordability, what funding will be necessary and when; and

Management case - ability to deliver a successful project.

For the Action Plan, the important elements are the strategic case and economic case, the remaining components are key features of the detailed implementation plan.

8.2 Strategic Case

This section is standard text that can be adopted.

The strategic case is drawn from the geospatial policy alignment, socio-economic impact assessment and action plan. Key national priorities that are expected to be supported by the Action Plan are direct economic impacts, as well as societal and environmental benefits. In this section we draw out a small subset of these:

From the Socio-economic Impact Assessment, list the major social, economic and environmental impacts. Examples are provided below.

Economic

i) Government

- Increasing revenue from land use fees and taxes by completing the land register.
- Improved property tax revenue collection from a single national street addressing system.

[20] An example of this approach is contained in the UK Treasury Green Book - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/685903/The_Green_Book.pdf

- Support to the National Development Agency with online access to more current and complete geospatial information.
- Reducing the costs of the subsidies systems by identifying potentially fraudulent claims.

ii) Business

- Reduced conflicts between mineral exploration and local protected areas by completion of cadastral registration of state land.
- Increasing crop yields by use of precision agriculture techniques to link satellite imagery to fertilizer and chemical distribution.
- Better asset management for utilities - the NSDI program will enhance the availability of current geospatial data enabling digitalization of paper records to be more accurate and converted more quickly.
- More efficient and less costly land and construction survey work from the availability of more CORS and real time positioning services.
- The real estate sector enabled to use web technology to provide new and improved commercial and residential property services to citizens using location data.

iii) Consumer

- Improved transport data to underpin more intelligent real time transport planning.
- Greater efficiency of transactions between citizens and businesses, especially by having a single national address database augmented with geographical position.
- Tools to allow better coordination of street works, reducing traffic disruption and producing travel time efficiencies and fuel economies.

<u>Societal</u>

Key impacts that are not easily expressed in economic terms, include:

- Integration of land registers providing a more transparent, consistent and up to date database to underpin growth of the land market by increasing the level of mortgages secured on land rights.
- Improved disaster response, making mobilization faster therefore reducing loss of life and costs of damage to forests, crops and property.
- Mapping of crime scenes and finding patterns that relate incidents together is facilitated by good topographic mapping data, therefore helping to reduce crime rates and improve public safety.
- Improved SDG reporting through enhanced geo-statistics.

<u>Environmental</u>

There are particular direct impacts upon the environmental protection and response to climate change, such as:

- Enhanced urban planning and smart city design through access to 3D “digital twin” information models.

- Better rangeland monitoring to match carrying capacity to quality of pasture, therefore avoiding over grazing and land degradation.
- Selecting sites for alternative energy schemes, particularly wind and geothermal will be aided by being able to visualize and analyze integrated themes of geospatial data.
- Heat loss from central heating systems can be pinpointed using thermal imagery.

It should also be observed that many benefits are multi-dimensional, positively impacting public, private sectors and civil society.

8.3 Economic Case

This section is standard text that can be adopted.

A separate report titled **"[Country] NSDI – Socio-economic Impact Assessment"** provides a full analysis of the economic case for investment. Here we present the summary from the analysis in a CBA model. This provides an "order of magnitude" assessment in financial terms of the ROI. The cash flow forecast is shown in the chart below.

Show the results of the Cost-benefit Analysis. An example is provided below.

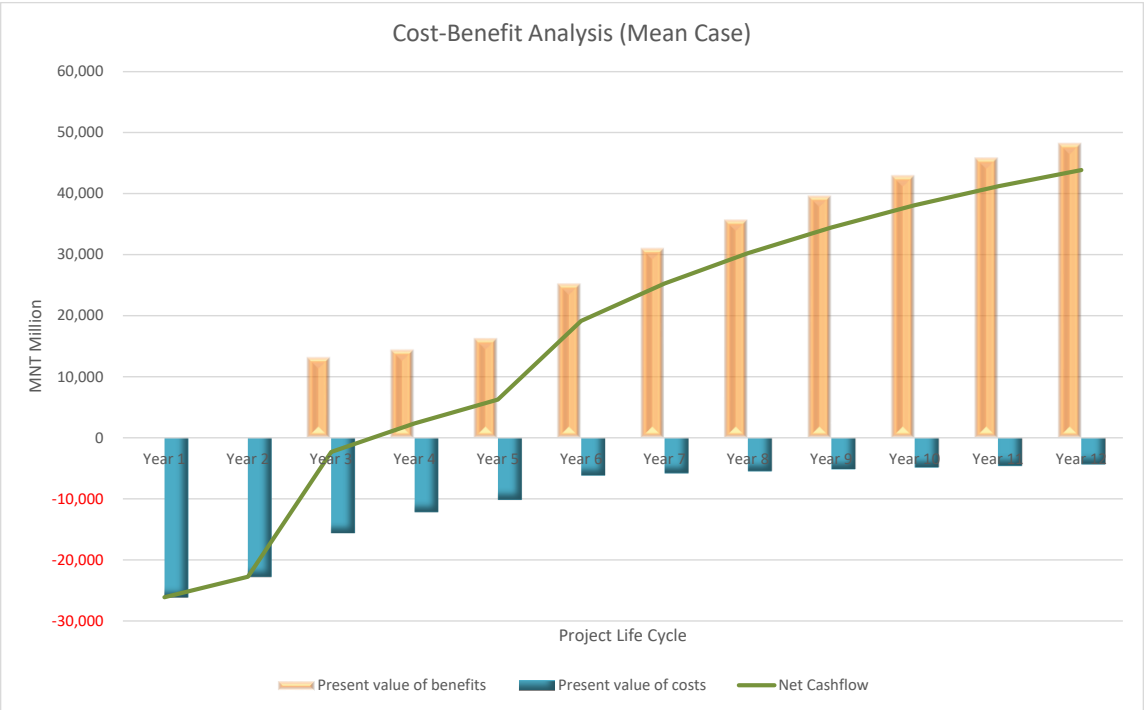


Figure 10 Order of Magnitude Cost-benefit Analysis

The analysis results in a Net Present Value (NPV) of 189.7 billion (USD 66.1 Million) and a Benefit-Cost Ratio (BCR) of 2.54, indicating the economic viability and attractiveness of the project.

It is important to stress that this assessment is based upon quantification of under 20% of the identified use cases. If data and time were not constrained, it is our expert opinion that the calculated ROI would be significantly higher.

Sensitivity analysis, to assess the robustness of the cost-benefits analysis, was conducted by making the following changes to the mean case outlined above:

i) For the lower bound (most conservative) benefit estimate, low bound impacts were used for all those quantified cases where ranges were available, as follows:

Use Case 2:	Reduced Loss and Damage during Disasters
Use Case 3:	Faster emergency response in case of building fires
Use Case 4:	Increased land use fees and taxes
Use Case 5:	Increased collection of Property Tax
Use Case 7:	Urban Planning efficiencies from 3D City Model
Use Case 10:	GNSS Densification reducing data acquisition costs

The BCR is reduced to 1.7 and the Net Present Value to 93.2 billion (USD 32.5 million).

ii) For the upper bound (optimistic case), we have applied the upper bound range of values for the same set of use cases as used in the lower bound.

The estimated BCR increases to 3.7 and the Net Present Value to 321.4 billion (USD 111.9 million).

We conclude that for policy advice, this is a viable investment that would not change even in the lower bound case.

9. CONCLUSIONS AND NEXT STEPS

This section is standard text that can be adopted.

This report is presented as a draft for discussion. The next steps are outlined through the rest of this section. Many of these steps will be undertaken in parallel.

9.1 Feedback

Circulate this draft to all stakeholders and invite comments on structure, intelligibility and veracity of the content, areas of omission and any other concerns.

9.2 Refine the Investment Plan

Given the nature of the investment and limited time and resources for the analysis, it must be re-stressed that the plan only provides an "order of magnitude" indication of the likely benefits.

The Action Plan may need to be "packaged" into a series of more detailed business cases for presentation to potential sponsors. In doing so, it must be considered that "unbundling" runs the risk that the level of benefits may be reduced on the basis that the "whole is greater than the sum of the parts".

9.3 Implementation

It needs to be acknowledged that the preparation of the Action Plan is only the start of a long-term program. The "selling" of the NSDI value proposition to gain funding will likely be an early task for most initiatives.

However, there are some components of the investment plan that have already been approved, this is indicated in the Investment plan spreadsheet. Further, there are a number of "quick wins" actions that can be implemented relatively quickly and could be approved by the Task Force for action by individual Ministries and Agencies. Early wins will engender confidence in decision makers in the benefits of investment.

Appendix A: List of Stakeholders

This section is standard text that can be adopted and adapted to suit the country.

Prime Minister

Vice Prime Minister

Cabinet Secretariat

Ministries

Ministry of Justice and Home Affairs

Ministry of Labor, Social Protection

Ministry of Mining and Heavy Industry

Ministry of Environment and Tourism

Ministry of Construction and Urban Development

Ministry of Defense

Ministry of Road and Transport

Ministry of Food, Agriculture and Light Industry

Ministry of Energy

Ministry of Health

Ministry of Education, Culture, Science and Sport

Ministry of Environment and Tourism

Ministry of Finance

Government Agencies

Communications and Information Technology Authority (CITA)

National Development Agency

National Emergency Management Agency

State Property Policy Coordinating agency

General Police Department

National Agency for Meteorology and Environmental Monitoring

Land Administration, Geodesy and Cartography Department

The Civil Aviation Authority

Mineral Resources and Petroleum Agency

General Agency for State Registration

National Statistics Office

Municipal Government

[Name] City

Commercial Sector Organizations

Defacto Magazine

Asia Pacific Investment Partners

[Country] Mining Association

ICT Group

Engineering Services

Open Street Map

Interactive LLC

Appendix A: List of Stakeholders

Appendix B: Stakeholder Workshop

This appendix may include the workshop agenda.

Integrated Geospatial Information Management

Stakeholder Workshop

Date: 30 May 2019, Venue: [Name]

8.30 – 9.00	**Registration**	
Inaugural Session		
Moderator:		Speaker Name
9.00 – 09.30	Welcome address Keynote Speech on "Need to Strengthen Integrated Geospatial Information Management" Opening remark	TBA TBA TBA
Information Session		
09.30 – 10.30	What is the Integrated Geospatial Information Framework? **"Introduction on Integrated geospatial information framework"** - ○ Part 1: Strategic Framework ○ Part 2: Implementation Guide ○ Part 3: Country Action Plan	TBA
10.30 – 10.50	Refreshments	
10.50 – 11.30	**Introduction on Needs Assessment and Gap Analysis** – ○ Environmental Scanning ○ Stakeholder Identification and Analysis ○ Stakeholder Engagement Workshop (To be held in conjunction with FGIM council) ○ Strategic Alignment (and Benefits) ○ Vision, Mission and Goals Q&A	TBA
Technical Session		
11.30 – 12.30	**Environmental Scanning Group Activities** • Discuss Political, Economic, Social and Technology drivers for change Each Group to report back on their discussion/findings	TBA
12.30 – 13.30	Lunch	
13.30 – 14.30	**Environmental Scanning Group Activities** • Discuss strengths, weaknesses, opportunities and threats Each Group to report back on their discussion/findings	TBA
14.30 - 15.10	**Environmental Scanning finalization**	TBA

	Discussion	
15.10 -15.30	Refreshments	
15.30 – 16.30	**Stakeholder Identification and Analysis** Discussion	TBA
16.30 – 17.00	**Facilitated discussion on the Vision and Goals for Integrated Geospatial Information Management**	TBA
Closing session		
17.00 – 17.30	**Wrap up** **Closing remarks**	TBA

Annex A: Use Case Inventory

This section is standard text that can be adopted. The tables are to be copied from the Geospatial Alignment to Policy Drivers report. An example is provided below

The use cases are detailed in the tables below, the **Geospatial Alignment to Policy Drivers report** provides more detail if required.

Table 12 Land Management and Administration Use Cases (Part 1)

Spatial Use Case Description	Priority	Lead Agency	Supporting Agencies	Primary Outcomes	Clarifying Description (if required)	Principal Data Types and Sources	Duplication of data or System	Additional Comments
Sector: Land Management and Administration								
Reduction in the number of land related disputes - from land cadastre and registration (from 30% in 2016, down to 10% in 2019)	H	ALAMGC GASR (General Authority State Registry)	MRPAM Ministry of Environment and Tourism (Enovirnmental Informantion Centre)	The availability of complete cadastral surveys linked to ownership registration will reduce number of cases coming to court by providing greater certainty through improve evidence location.	Prior to the national system coming on line - each officer was drawing their own maps and this was promolgating disputes. No one agency has responsibility for the national cadastre.	Cadastral surveys Land Registration MRPAM (Mining rights) Local Protected Areas (Aimags and Soums)	Inconsistency currently between land registry and cadastral database.	It is not clear how much disputes costs and how long do they take. Costs include private individuals, businesses and Government.
Land Administration improved by State Land Registration - leading to reduced compensation payments to individuals and businesses for land rights removed in the prcoess of government development of roads and other public infrastructure.	VH	ALAMGC	MRPAM Ministry of Environment and Tourism (Environmental Informantion Centre) Ministry of Defence	Complete state land registration will help reduce errors (and associated costs) when allocating land rights. The complete registration will ensure that a full picture of land rights in Mongolia is available. Sharing this informaiton with other agencies in real time will asssist in preventing the issuance of spatially overlapping rights, help the planning process for new infrastructure and and land use planning and generally lead to smoother running of all government land administration.	Only 4% of the Country has been mapped, cadastral parcels defined and registration of ownership certified - mainly private property. Link to SRS/GASR is only 10% validated (verification and re-issuing of certificate).	Cadastral surveys Land Registration MRPAM (Mining rights) Local Protected Areas (Aimags and Soums) One Map themes particularly roads and buildings	Local "Sketch Maps" are held by Aimag and Soums land mangement offices, these are not to a common accuracy standards and not referenced consistently.	Approved project to start in 2020 but only small amount of funding, so needs prioritisation.
Increase Land Fees and Taxes Collection	VH	ALAMGC	Local Authorities (Aimag, Soum) UB City - Land Management Department	Taxable land use fees are based on a number of different categories of land, each with its own fee. Currently the absence of a complete register of state land means that the system is inefficient and the tax collected is subtantially lower than it should be. Completing the state land registration, and bi-directional data sharing with other agencies, will allow for accurate assessment of the tax due on a land parcel for all types of rights and will assist in identifiying where either incorrect rates currently levied on a piece of land or where no rates are levied.	Lack of registration means the current tax collected is too low. Estimates from ALAMGC indicate 2 to 3 times current take if all land registered.	Cadastral surveys Land Registration MRPAM (Mining rights) Environmental Protected Areas Local Protected Areas (Aimags and Soums) One Map themes particularly roads and buildings	Local "Sketch maps" are held by Aimag and Soums land mangement offices, these are not to a common accuracy standards and not referenced consistently.	Additional revenues estimated by ALAMGC resulting from completion of cadastral parcels survey.