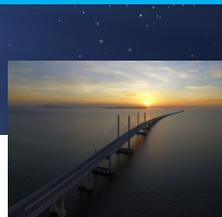
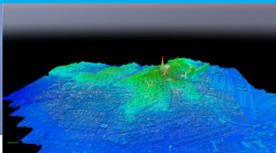




Executive Summary

DEVELOPMENT OF NATIONAL GEOSPATIAL MASTERPLAN (NGMP)



DISCLAIMER :

This NGMP Executive Summary is a **proposal** provided in Bahasa Malaysia and English language versions

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The development of the **National Geospatial Master Plan (NGMP)** is a study carried out under the auspices of the Ministry of Water, Land and Natural Resources (previously known as Ministry of Natural Resources and Environment) through the Malaysian Centre for Geospatial Data Infrastructure (MaCGDI). The Terms of Reference includes provisions for a comprehensive geospatial management study and the preparation of NGMP. Azaine & Fakhrul successfully undertaken the study over a period of 23 months beginning from June 2016.

The results of the National Geospatial Master Plan Study are presented in the following documents:

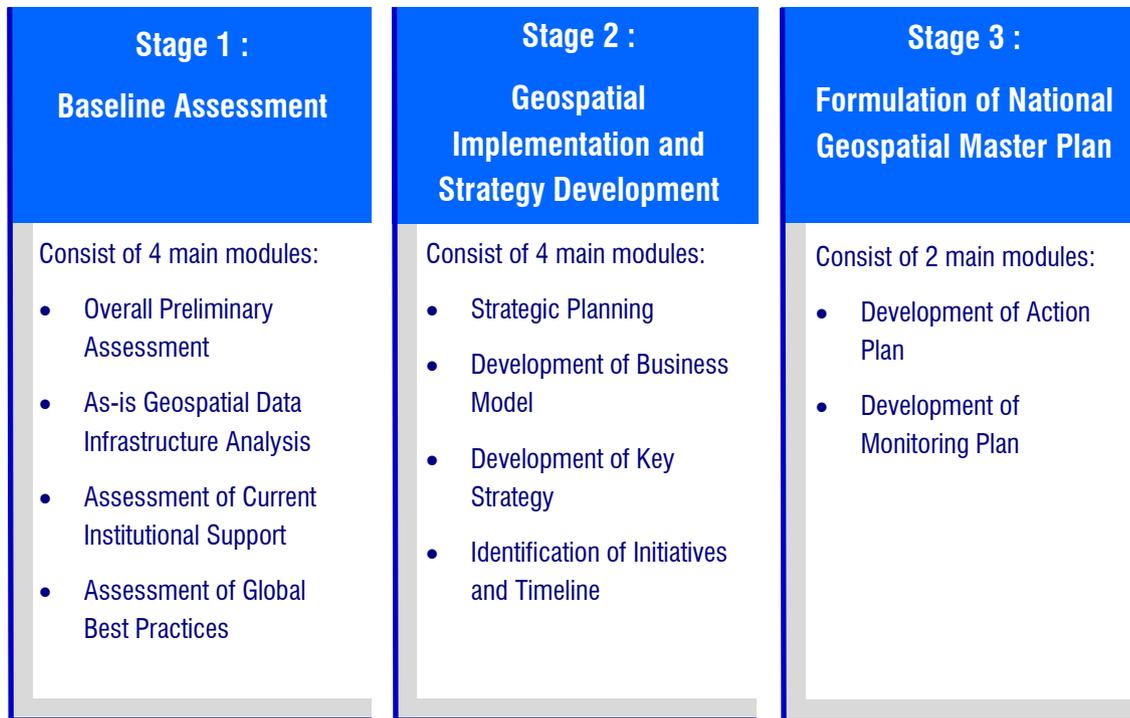
- Volume 1 – Introduction
- Volume 2 – Draft National Geospatial Policy
- Volume 3 – Proposed National Geospatial Governance Structure
- Volume 4 – National Geospatial Bill
- Volume 5 – Proposed National Geospatial Enterprise Architecture Framework
- Volume 6 – Proposed National Geospatial Strategic Plan



EXECUTIVE SUMMARY

PROCESS OF PREPARATION FOR NATIONAL GEOSPATIAL MASTER PLAN (NGMP)

- The development of NGMP is implemented collaboratively through consultation with over 1,000 individuals representing various interests in national geospatial management .
- The direction of NGMP is guided by the Steering Committee with the support of the Technical Committee, Project Team, Tetuan Azainie & Fakhrul and relevant stakeholders.
- Overall, the preparation of this NGMP involves three levels:





Interaction with Stakeholders

27	Leadership Consultation	600+	Survey Feedbacks
8	Workshop with Federal Agencies	10+	Specialist and International Advisor
2	Workshop with Academia	20+	Specialist and Malaysia Advisor
3	Workshop with Private Sector and Professional Body	5	National Surveys
16	Visit and Workshop with State Agencies	640+	Stakeholders Representative
20	Case Study with Stakeholders	29+	Workshop Session
14	Focus Group Discussion	300+	Government Officers
		20+	Study Meeting

NGMP Development Group

48	NGMP Study Team
5	Document's Team Writers
12	Main Writers
10+	Language Specialists
10+	Researchers

Consultant

AZAINÉ & FAKHRUL
Advocates & Solicitors Peguambela & Peguamcara

Project Consultant



International Advisor





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IMPORTANCE OF NATIONAL GEOSPATIAL MASTER PLAN

Geospatial services play an important role in fostering growth, employment and income in the country. Estimates of economic benefits obtained from case studies conducted in this current study suggest that the application of geospatial technologies in selected sectors of the Malaysian economy had contributed upwards of RM700 million in 2017. This figure is projected to rise to RM 4.8 billion by 2027.

The development of the National Geospatial Master Plan (NGMP) is to realise the latent potentials of geospatial technology. The NGMP is formulated in line with the Malaysian government's National Transformation or *Transformasi Nasional* (TN50) – a new 30-year transformational plan formulated with the aim of transforming Malaysia into a nation of calibre with a new mindset.

To achieve this stature, both the public and private sectors in the country need access to geospatial information. This will enable them to make the right decisions and to take appropriate actions in planning and executing development activities and projects.

In view of the significance and importance of geospatial information in nation-building and development, there must, therefore, be several sets of processes that determine how the needed information should be produced, gathered, disseminated, shared and used. This is to avoid duplication and misuse of information as well as to pre-empt controversies and ambiguity in decision-making.

Strengthening the National Spatial Data Infrastructure (NSDI) through implementing the NGMP will help achieve the following:

- 1 enhance productivity and the delivery system of public services;
- 2 help to develop and implement the geospatial industry in the country
- 3 augment the ability to defend the country's sovereignty and security; and
- 4 diversify activities that can contribute towards economic growth.



The vision of NGMP is in having a spatially enabled government, business and society as a catalyst that contributes towards Malaysia's economy and social development. It is projected that success in the NGMP implementation will mark a turning point in the service delivery and management system in Malaysia.

NATIONAL GEOSPATIAL MASTER PLAN AS THE 'GAME CHANGER'

The NGMP is “a game changer” to accelerate the growth of geospatial services and help to achieve high income nation status by 2050. The NGMP will be for all geospatial stakeholders (government, private sector, academia and citizen) in Malaysia, across various sectors.

The National Geospatial Agenda, which is also known as the Geospatial Industry Transformation and Growth Agenda, is a whole-of-sector initiative of business, government, research, academia and spatial-user organisation. It sets out the roadmap to accelerate growth that will transform the Malaysian geospatial sector and location-dependent industries over the next 10 years. It is projected to influence the development of the economy Malaysia-wide and of the society at large. The six key pillars of the transformation provide the framework for the 35 key initiatives that are the engines of the transformation:





Figure 1 Six Key Pillars of the Transformation in National Geospatial Agenda

The high impact enablers within the NGMP, such as the National Geospatial Policy, Governance Structure, Act, Enterprise Architecture and Strategic Plan will be critical contributors in taking the national geospatial industry to the next level.

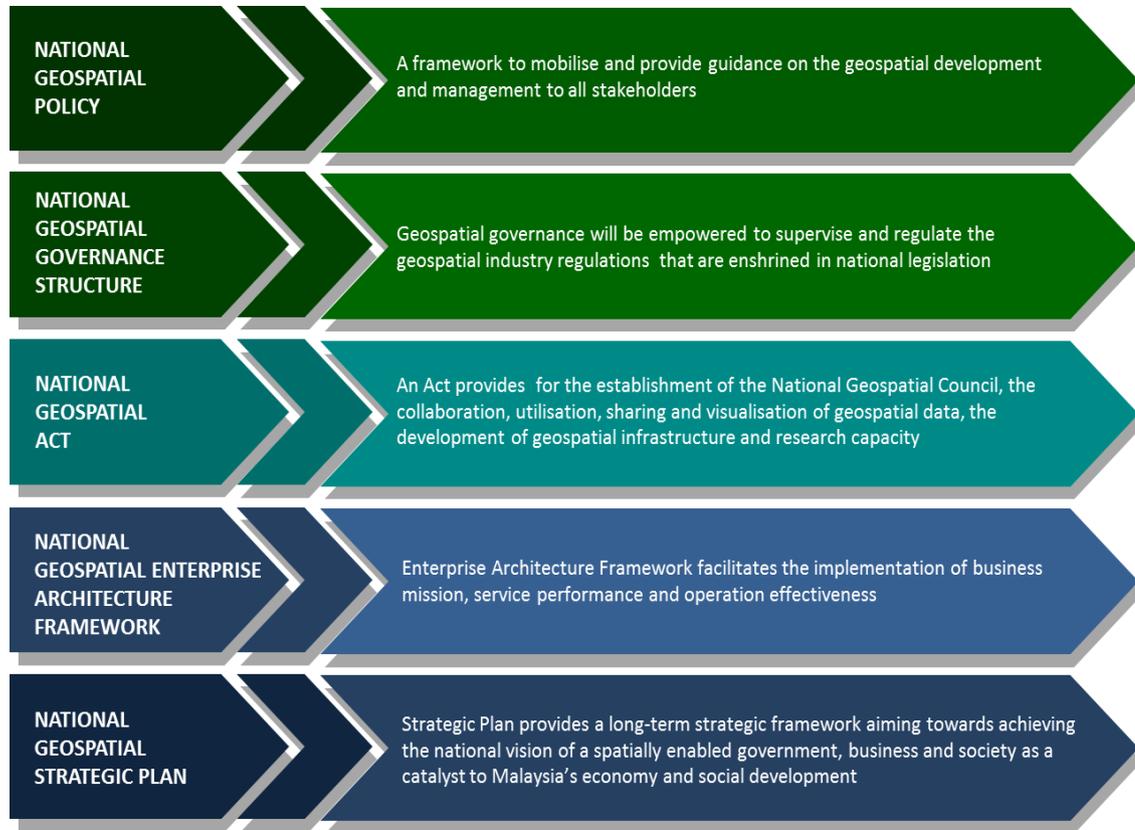
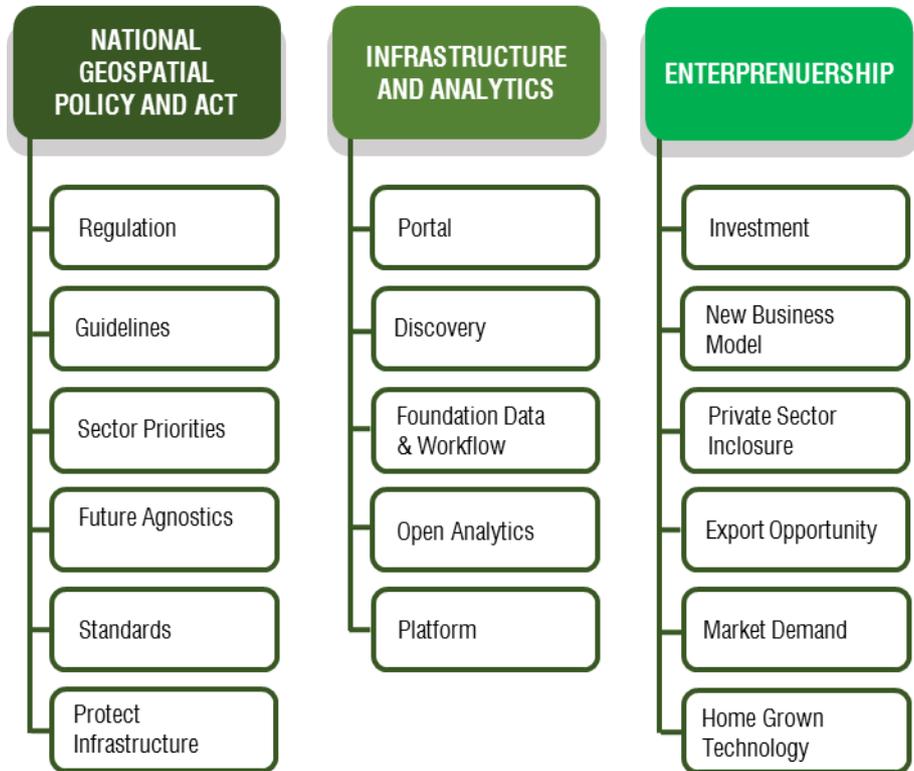
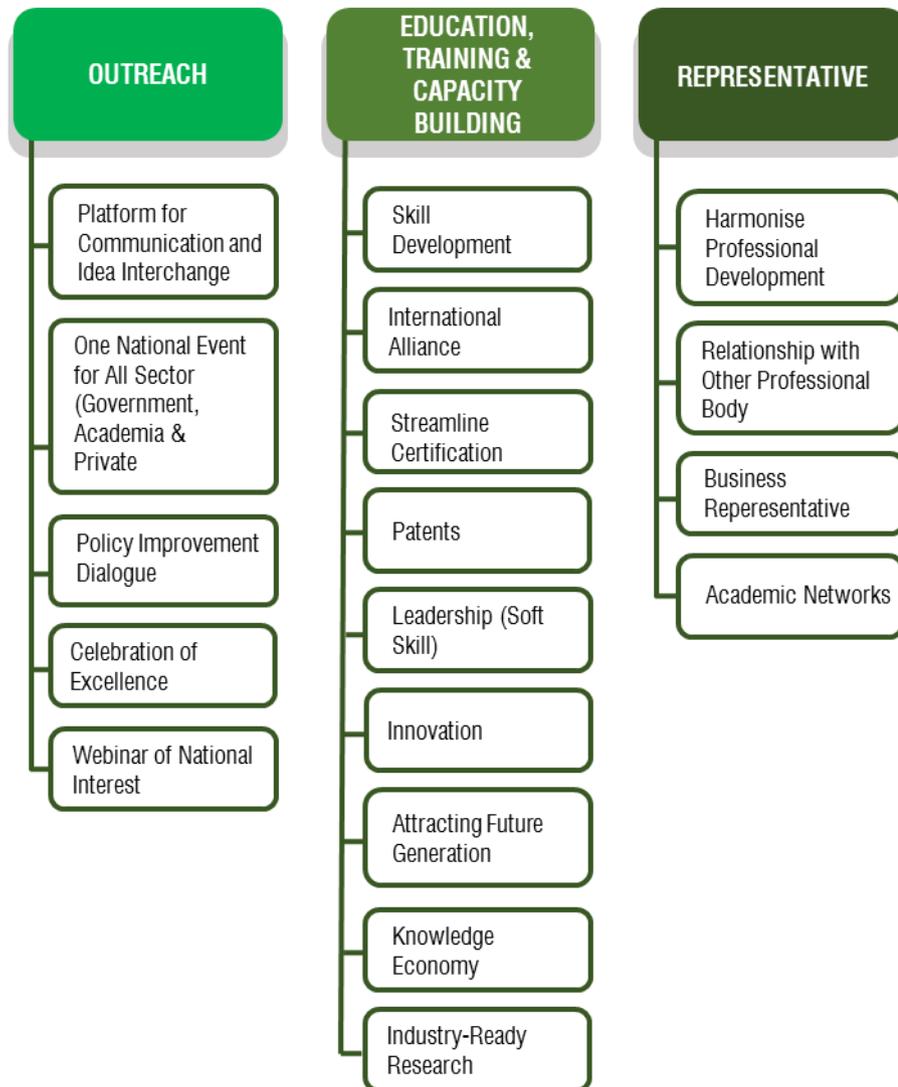


Figure 2 Five Components in National Geospatial Master Plan

NATIONAL GEOSPATIAL AGENDA



35 FOCUS AREAS FOR 6 KEY PILLARS OF THE TRANSFORMATION



A NEW APPROACH TO NATIONAL GEOSPATIAL DEVELOPMENT

The NGMP will adopt a new approach to geospatial development which is outcome-based. To facilitate this, the NGMP will put in place a comprehensive NGMP Implementation Performance Monitoring to ensure effectiveness of the programmes formulated. For the first time in geospatial management in Malaysia, a “live plan” concept is introduced so that the NGMP will remain relevant with changing times. These programmes may need to be fine-tuned over time to adjust to environmental and structural changes that may take place.

The NGMP will cater to the business needs of stakeholders and will be implemented in collaboration with the private sector through public-private partnerships. The role of industry associations and higher learning institutions will be further enhanced to assist in reaching out the programmes to other public and private sector entities in the country and in capacity building at the district, state and national levels.



THE STATUS OF SPATIAL DATA INFRASTRUCTURE IN MALAYSIA

Spatial Data Infrastructure (SDI) in Malaysia is defined based on six SDI domains which are strategy, policies, human capital, data, technology and access and discovery. Based on the study for the NGMP, SDI maturity in Malaysia had demonstrated six key characteristics as stated in *Figure 3A and 3B*.

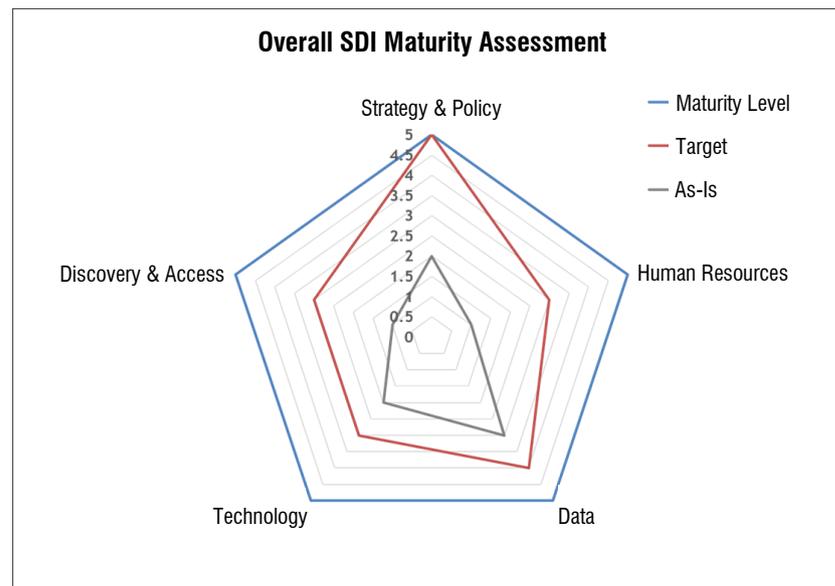


Figure 3A As-Is and Target for SDI Maturity in Malaysia

Status of SDI in Malaysia

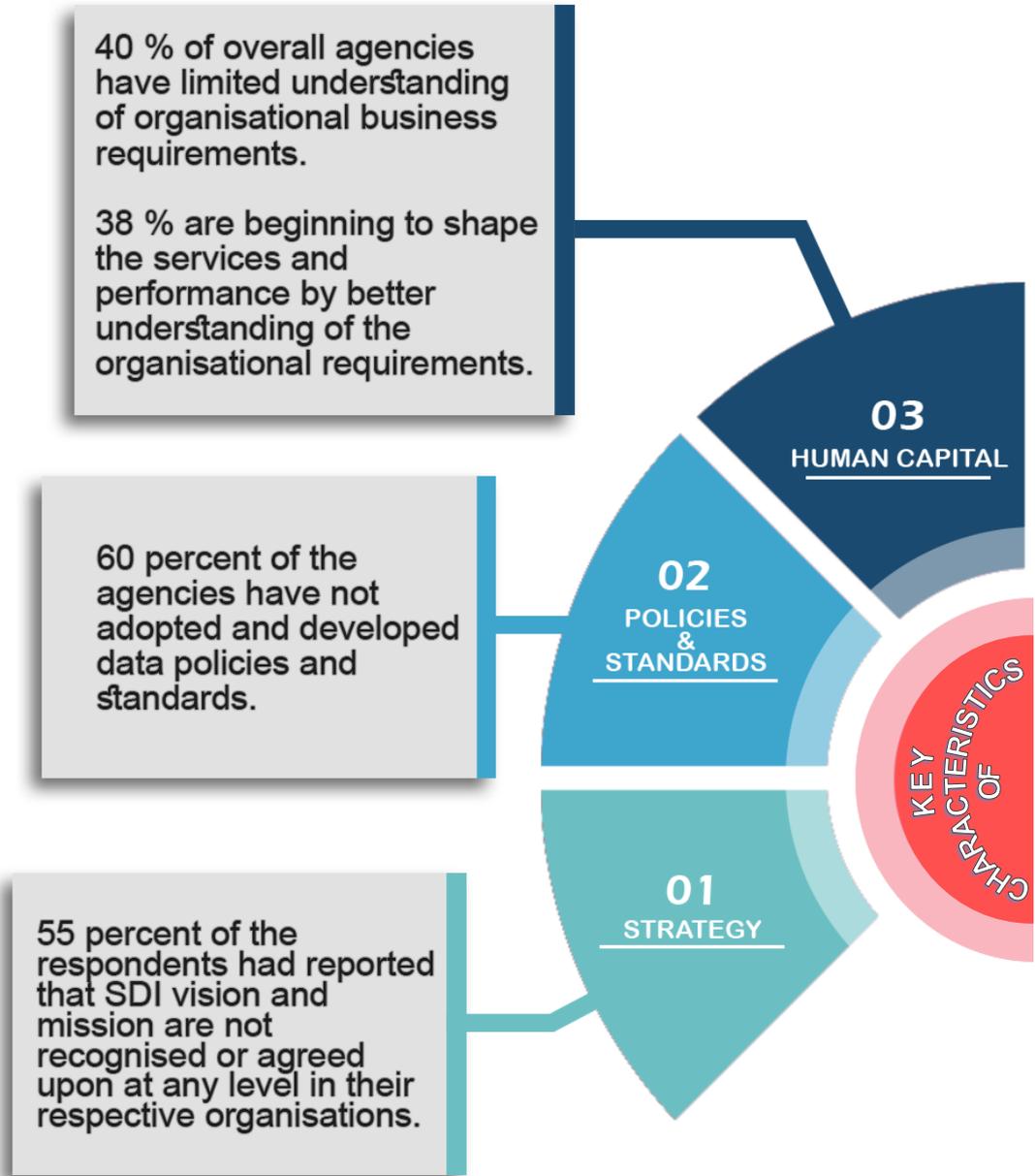
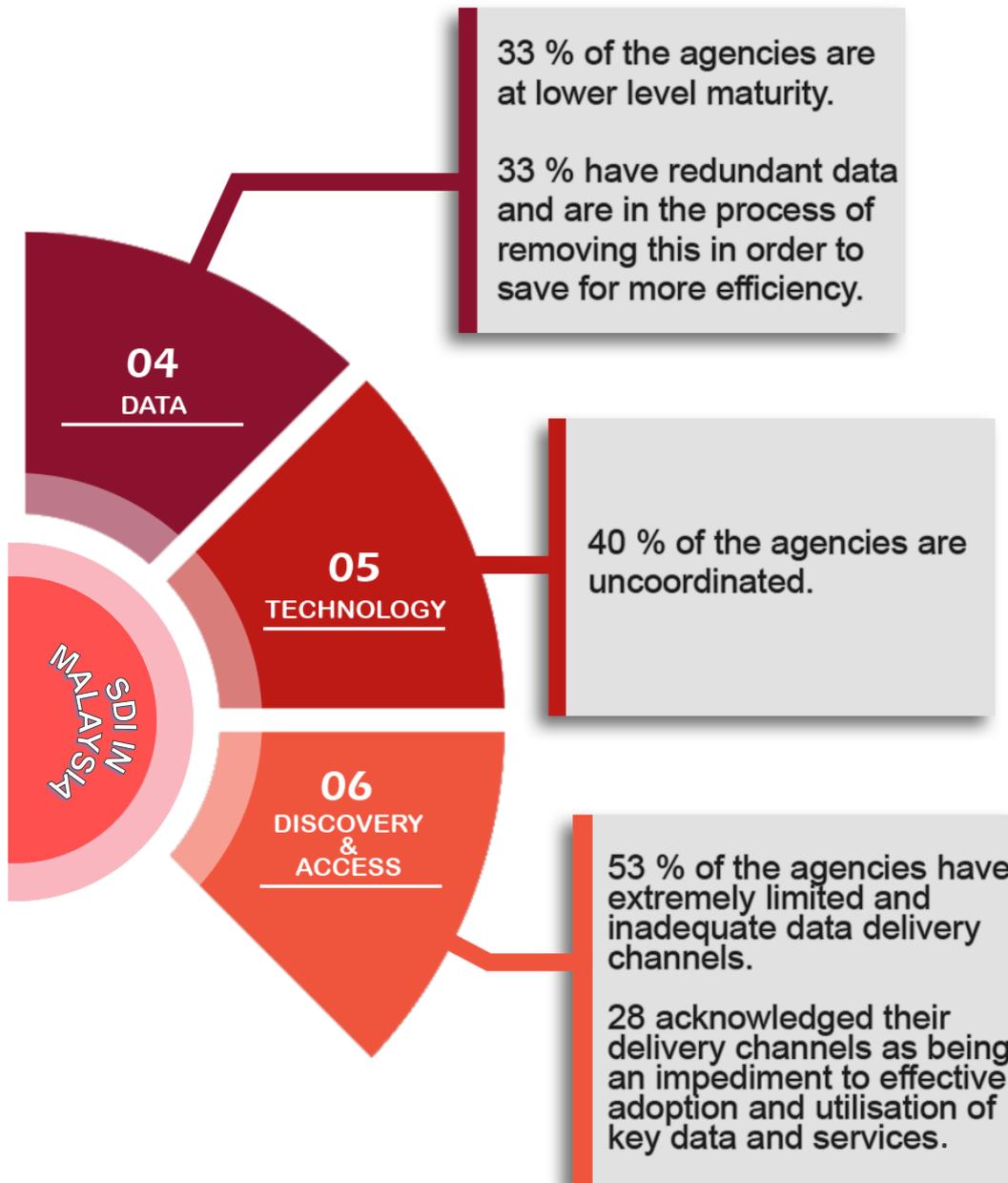


Figure 3 Six Characteristic of SDI in Malaysia



NATIONAL GEOSPATIAL DEVELOPMENT LEVERS

In order to accelerate the growth of geospatial development, it is important to understand the forces that drive the performance of SDI. Based on a technical analysis on geospatial implementation maturity, the NGMP has highlighted six factors that influence the performance of SDI.

- 1** Realise the National Geospatial Agenda
- 2** Strengthen stakeholders' ability
- 3** Provide a shared platform for easy access
- 4** Promote the systematic sharing of geospatial content
- 5** Promulgate laws, guideline and directives related to geospatial
- 6** Facilitate relevant RDC&I (research, development, commercialization and innovation)

All these performance levers should be enhanced simultaneously as shortcomings in any of these levers will prevent geospatial development from reaching their full potential. Currently, geospatial development is not achieving high performance due to challenges faced.

NATIONAL GEOSPATIAL MASTER PLAN IN SUPPORTING MALAYSIA'S ASPIRATION

The National Geospatial Master Plan (NGMP) is based on a long-term strategic framework aiming towards the national vision of a spatially enabled government, business and society as a catalyst to Malaysia's economy and social development. The mission is to develop a coordinated approach for effective and efficient national level geospatial data discovery, sharing and its utilisation for government, businesses, academia and general public.

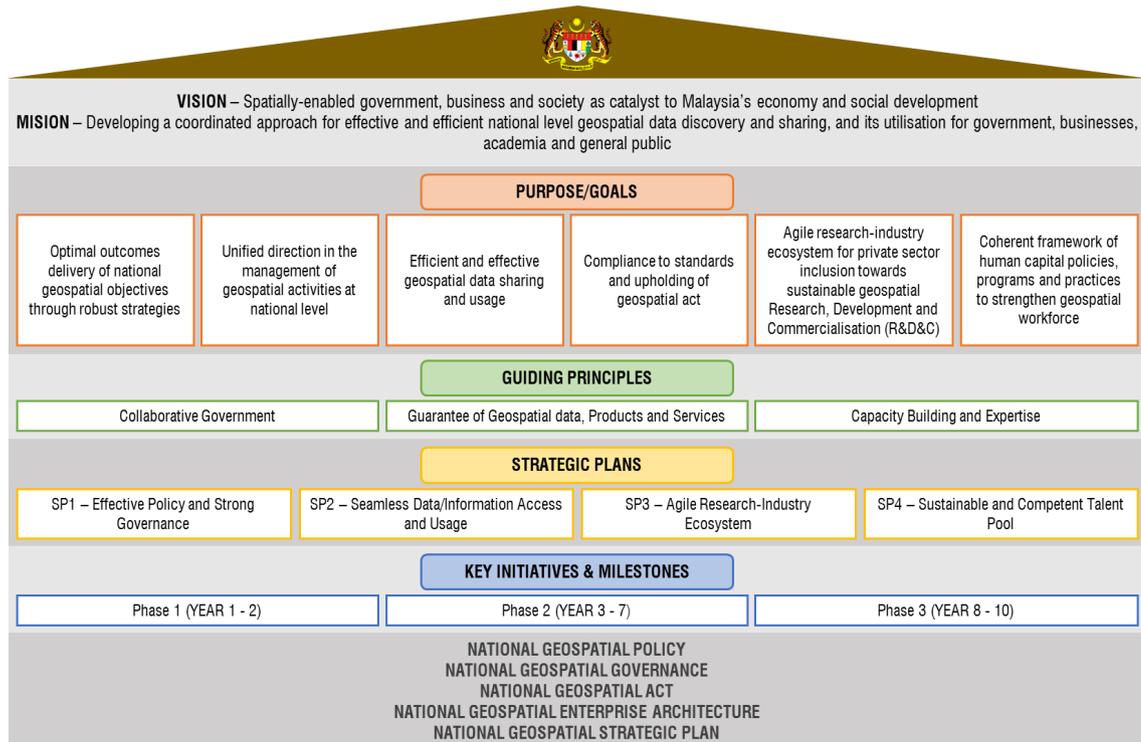


Figure 4 National Geospatial Master Plan Framework

HIGH IMPACT ENABLERS OF NATIONAL GEOSPATIAL MASTER PLAN

The NGMP has proposed five High Impact Enablers, including 12 initiatives that make a difference and will contribute significantly towards achieving the goals of the NGMP.

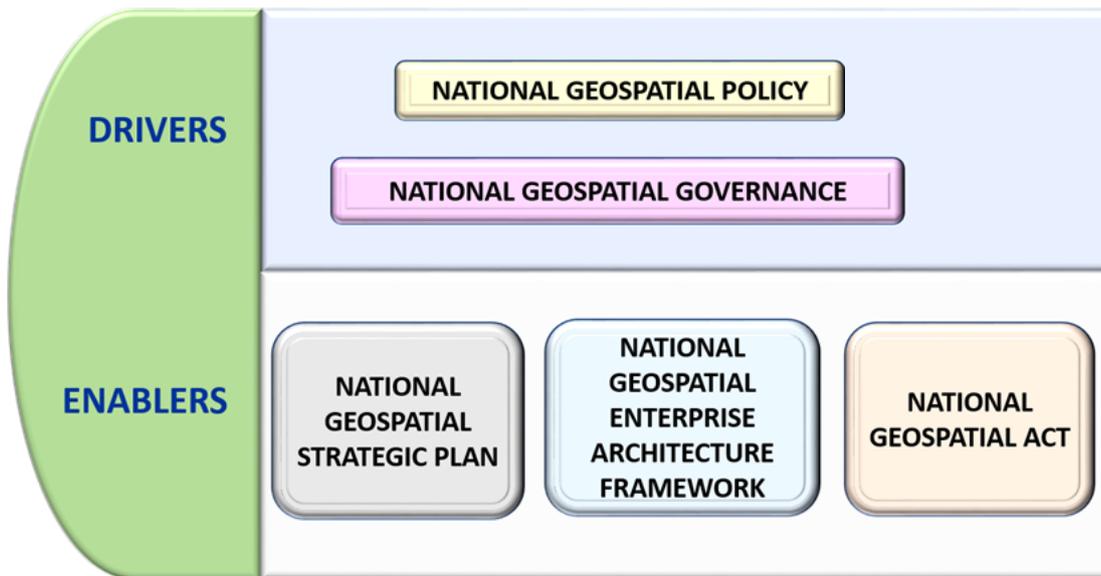


Figure 5 National Geospatial Framework

1 - NATIONAL GEOSPATIAL POLICY

The Eleventh Malaysia Plan, 2016-2020 (11MP) mentions the need to formulate a new policy framework which includes the drafting of a national geospatial information management policy and geospatial information management legislation. The country needs to ensure the wellbeing of its citizens by becoming a high-income economy. The citizens shall also feel safe from internal disturbances and external threats, as well as feel protected from natural disasters if and when they occur. To support and realise all these, Malaysia need relevant information to be acquired quickly. With information, Malaysia can make decision and take action properly and fast when required.

Considering the world situation today, it is advisable for Malaysia to harness the geospatial information. To keep abreast with the developed world, a spatially-enabled Malaysian government and society must be immediately addressed. Otherwise, the country will lag behind, and cannot compete globally.

Indeed, in terms of security and national defence, public safety, search and rescue operations, safe marine navigation, and road safety and emergency services, the geospatial information is required. Other areas that require geospatial information include the following: modern agriculture, regional growth, universal health care, affordable housing, environment for green growth, natural resources for future generations, climate change, transport system, trade facilitation, water services, energy usage, construction, competitive cities, and quality public services. In addition, if Malaysia were to implement geospatial management in accordance with global best practices, the geospatial activities that ensue can reduce costs and help increase revenue, thus contributing to the Gross Domestic Product of the country.

Presently, however, information needed by the country's sectors come from disparate sources, jurisdictions and mandates. This results in some information not being easy to access, and are also difficult to share. Some of the information obtained might also be inaccurate and not current.

Hence, the Malaysian government needs to formulate a National Geospatial Policy (NGP) to address the above challenges. The NGP will also provide guidance to all parties responsible for implementing the National Geospatial Agenda, and will furnish valuable policy related information to stakeholders, partners and the society at large in the pursuit of a better life.

Policy Framework

This policy is designed not only to achieve the stated goals but also to be relevant and realistic in order to meet the needs of all stakeholders. As such, the policy will help to ensure the development of a resilient nation that meets the aspirations of the people. The NGP serves as a framework to mobilise and provide guidance to all stakeholders including government agencies, industry and communities in the management and administration of geospatial information.

The National Geospatial Policy will among other things attempt to:

- Determine the direction of development and management of National Geospatial Agenda;
- Recognise data sharing through collaborative governance;
- Strengthen a National Geospatial Agenda through planned coordination;
- State the national stance and objective in keeping abreast with geospatial technology;
- Provide inclusive environment for government, private sector, academia and society; and
- Provide a unified platform for skills development.

Policy Statement

“Enhancing socio-economic growth and global competitiveness through empowering a coordinated approach for a national geospatial agenda to support national sovereignty, security and development as well as the people's wellbeing”

Policy Objective

The objective of the National Geospatial Policy is to:

- 1** Strengthen the direction and strategy for joint action so that the sharing of geospatial content is systematic through effective and efficient management and good governance.
- 2** Build and strengthen stakeholders' ability in an effective and inclusive manner by focusing on human resources, technology, standards and best practices.
- 3** Provide a shared platform to ensure and guarantee the quality and availability of geospatial information, products and services through best practices, current standards and ease of access.
- 4** Realise the National Geospatial Agenda that supports national economic transformation through Spatially Enabled Government and Society.
- 5** Ensure that the laws, guidelines and directives related to geospatial are complied with and implemented by all stakeholders.
- 6** Encourage research and development through academic networks, promote innovation in government, and support commercialisation for private sector opportunities.

Policy Principle

In implementing the National Geospatial Agenda and in promoting participation by all concerned with NGA, it is of utmost importance that the following principles are adhered to:



Figure 6 Policy Principles

Policy Focus



Figure 7 Policy Focus Based on Policy Principles

Strategic Thrusts

Guided by the policy principles and particularly to achieve the policy objectives, six strategic thrusts have been identified:

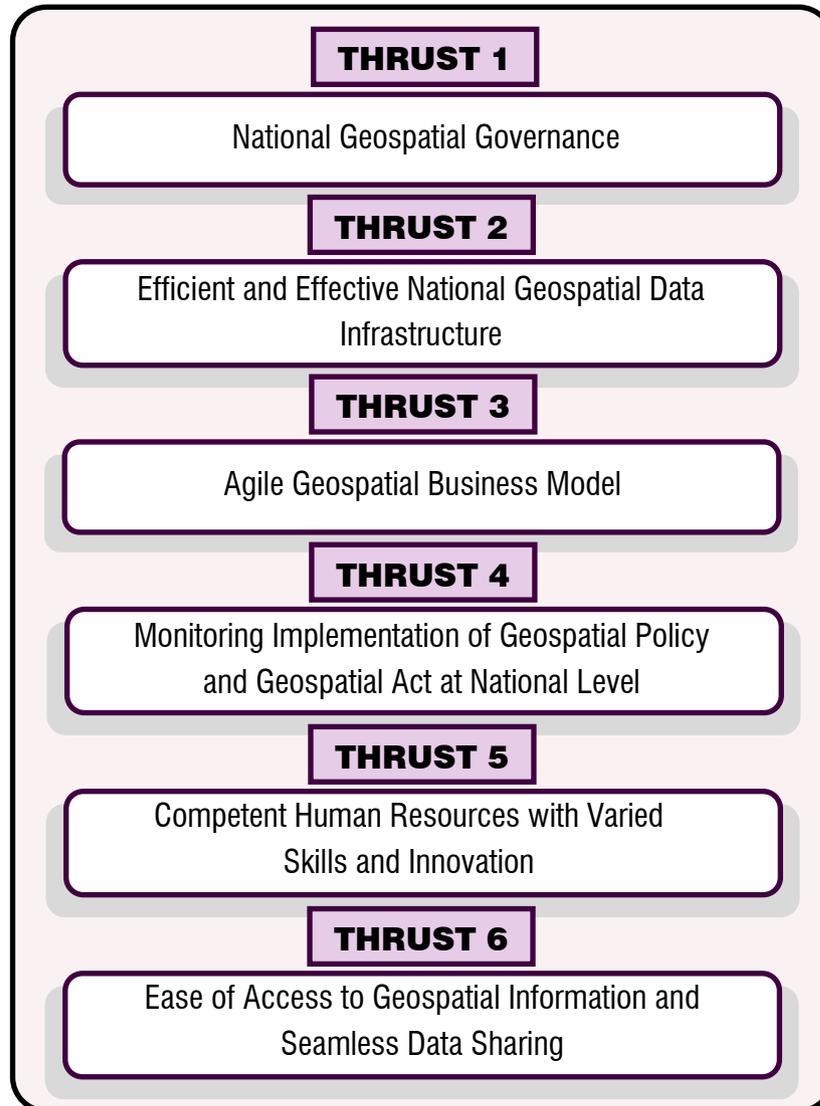


Figure 8 Strategic Thrust

2 - NATIONAL GEOSPATIAL GOVERNANCE STRUCTURE

To become a developed nation in an increasingly challenging global environment, enhancing the government service delivery of geospatial information is an important agenda. This entails the transformation of geospatial information management. In this respect, some of the best practices include promoting the collaboration and trust of stakeholders and mainstreaming the use of geospatial information in various sectors. However, several major issues that have led to inefficient governance. These are as follows:

- The absence of regulatory moves, coordination or any systematic governance at the highest government level;
- The direction of geospatial governance and strategy is not adequately recognised;
- SDI is not fully recognised;
- SDI governance is not adequately acknowledged;
- Limited spatial resources, skills and expertise;
- Inter-organisational conflict; and
- Lack of cooperation between government agencies.

Findings from the studies carried out indicate that strong, top-down national NSDI leadership by the central government is essential for successful SDI implementation from the start. There are five reasons that support the critical need for strong governance leadership for Malaysia's geospatial development:

- Geospatial information is also concerned about national security issues, sensitivity of international boundary and disaster management;
- Geospatial management involves federal and state matters such as land and water; and
- Safety and diversification offers considerable opportunity for future economic growth since geospatial industry is considered as strategic sector.

Two of the key success factors for cost-effective management of geospatial information is strong leadership and partnership. In most of the developed countries studied, strong government leadership and organisational partnerships have been evaluated as being a primary drive towards a successful NSDI.

Regulator Organisational Structure

A national regulatory body should be more holistic encompassing the functions and responsibilities in regulating national geospatial policy and regulation. This body is proposed to be carried out by the existing agency, Malaysian Centre for Geospatial Data Infrastructure (MaCGDI) which will be restructured. This regulatory body will be referred to as 'The Implementing Agency'.

The Vision, Mission and Objectives of this Implementing Agency are as follows:

Vision

Spatially enabled government, business and society as a catalyst to Malaysia's economy and social development;

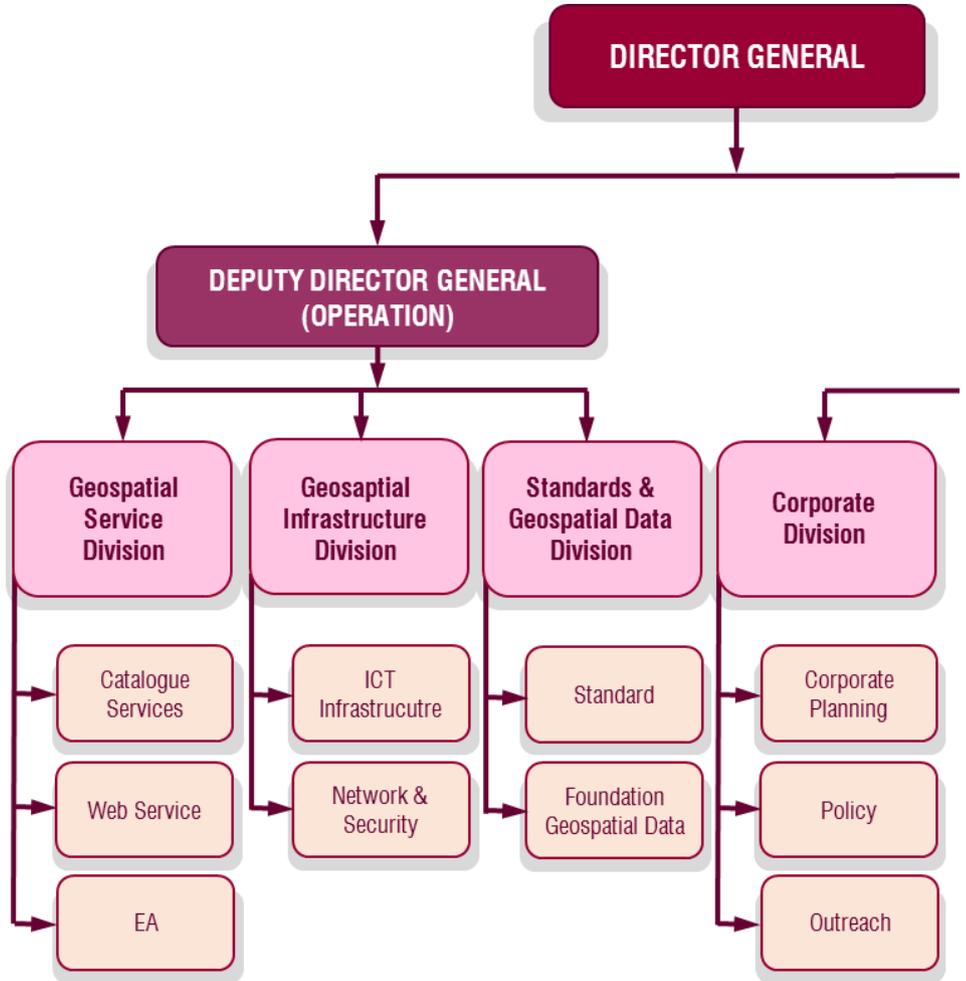
Mision

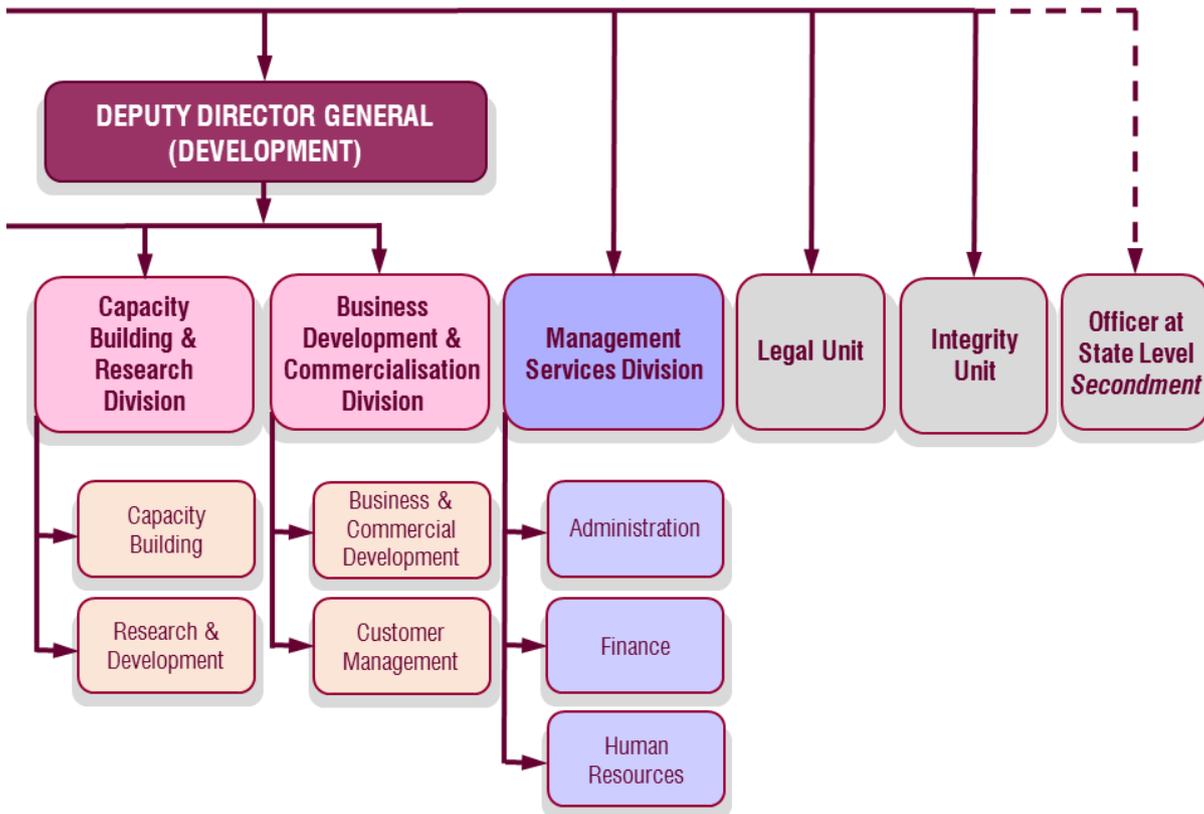
Developing a coordinated approach for effective and efficient national level geospatial data discovery and sharing, and its utilisation for government, businesses, academia and general public;

Objectives

- To provide services on support, implementing consultation and coordination in NSDI Malaysia; and
- To enhance strategic collaborative networks between public, private and academic sectors for geospatial-related activities and investments in all areas of services.

REGULATOR ORGANISATIONAL STRUCTURE





The Implementing Agency will take into consideration the following functions:

- To implement the National Geospatial Policy and develop strategies in consultation with the Federal Government, State Governments, academia and private sector;
- To regulate and enforce the National Geospatial Act;
- To be the secretariat for the National Geospatial Council (NGC) and National Geospatial Coordinating Committee (NGCC);
- To be the lead agency to coordinate the development of geospatial standards in consultation with Federal Government, State Governments, academia and private sector;
- To coordinate and support the development of the National Geospatial Agenda;
- To be the one-stop centre for sharing national geospatial data by working and coordinating with the Federal Government, State Governments and with academia;
- To develop a web services platform to deliver Foundation Geospatial Data (FGD) and its utilisation by the Federal Government, State Governments, academia and private sector;
- To be the coordinator/facilitator for geospatial investments, geospatial professional bodies and capacity building;
- To be a technical reference centre for research and development;
- To provide guidelines on emerging technologies and trends in consultation with the Federal Government, State Governments, academia and private sector; and
- To organise various activities in promoting the national geospatial programmes/agenda.

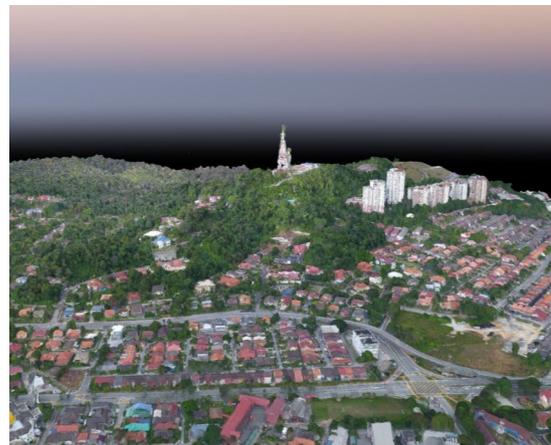
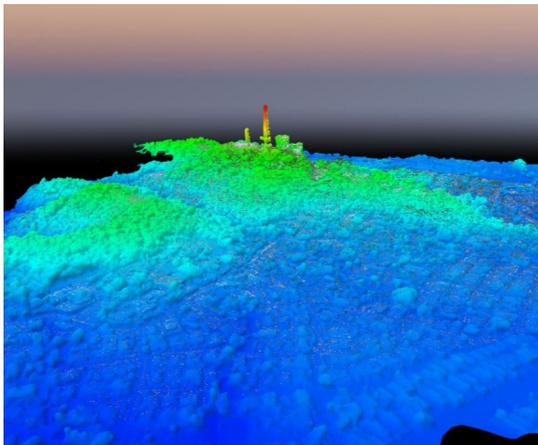
Coordination at National Level

In terms of governance at the highest level, which includes implementation, coordination and monitoring of policies, the following issues are identified:

- No coordination by any of the country's highest-level governance authorities; and
- Existing committees at either the state or national level only carry out their responsibilities as specified in the terms of reference with limited jurisdiction.

Based on the proposed coordination framework in National Geospatial Policy as depicted in *Figure 10*, the implementation of the National Geospatial Policy will be regulated and governed by the highest Government body of the new geospatial council and committee. Meanwhile, for operational and technical activities, the existing committees will remain as technical committees.

The interaction between national geospatial organisation structure and framework is depicted in *Figure 11* as the new National Geospatial Governance. The national geospatial organisation structure comprises of National Geospatial Council (NGC), National Geospatial Coordinating Committee (NGCC), the Implementing Agency and two new committees as Regulator and Coordinator, existing geospatial technical committees and users from all the related sectors .



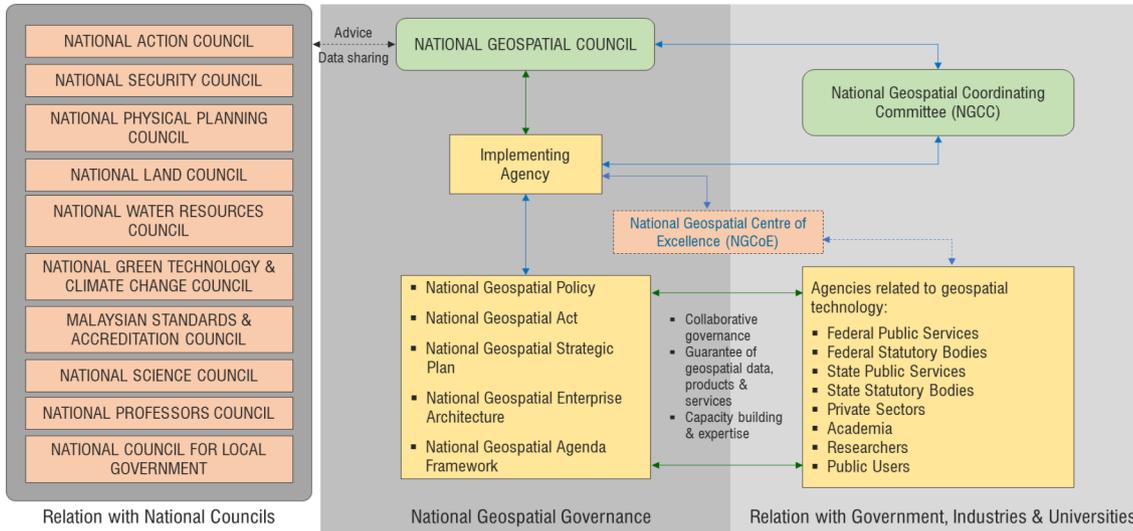


Figure 10 National Geospatial Governance Coordination Framework

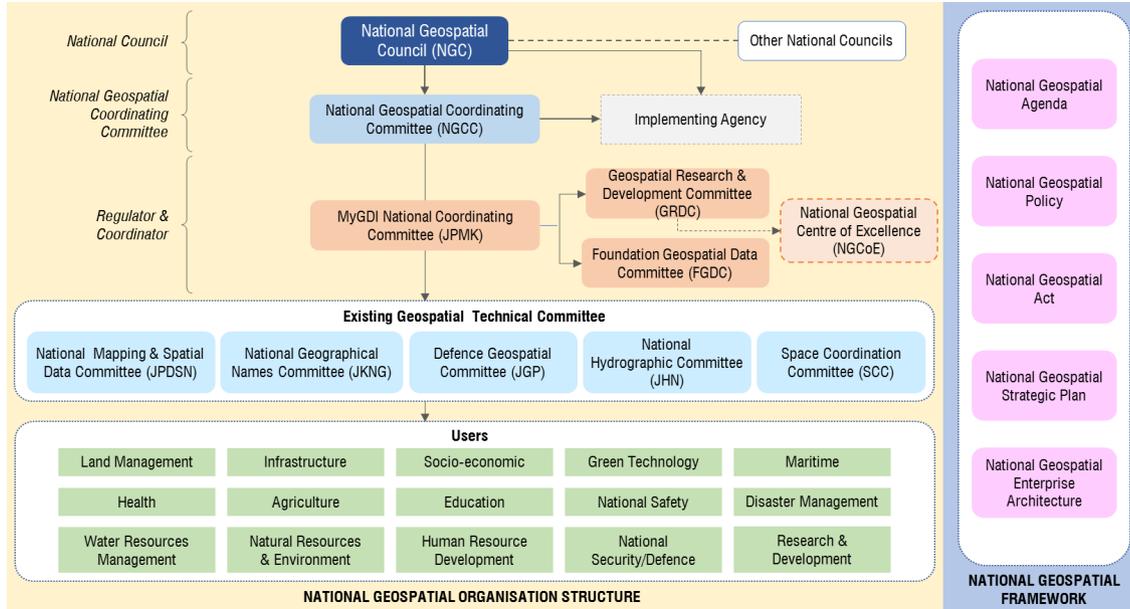


Figure 11 New National Geospatial Governance

National Geospatial Council

The establishment of a National Geospatial Council (NGC) is needed to discuss and resolve various issues related to geospatial and power between the Federal Government and the State Government. The NGC is also to streamline the management of geospatial among all stakeholders, including the public and private sectors, at both Federal and State levels.

The proposed NGC is to be chaired by the Prime Minister of Malaysia. He will be supported by the Deputy Chair of NGC, who will be the Deputy Prime Minister of Malaysia. The Director General of the Implementing Agency will provide secretariat services for NGC.

The objectives of NGC are as follows:

- To control and coordinate Government entities on development and management concerning national geospatial; and
- To issue directives to any Government entity on matters concerning national geospatial.

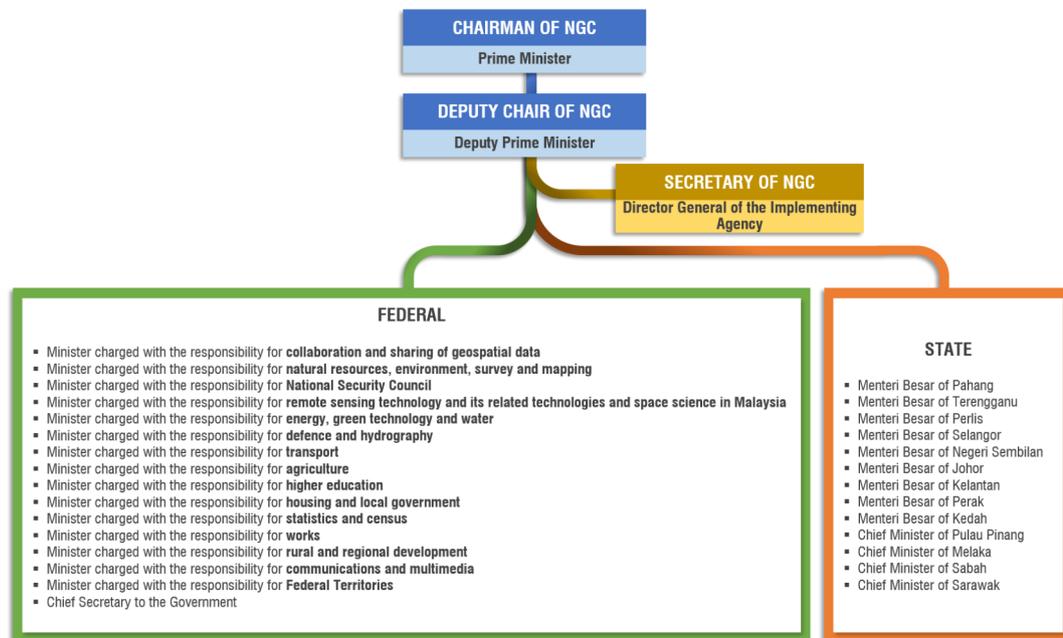


Figure 12 Proposed Structure of National Geospatial Council (NGC)

National Geospatial Coordinating Committee

The National Geospatial Coordinating Committee (NGCC) is proposed to support the NGC functions at the operational level. The NGCC will be chaired by the Deputy Chair of NGC. The membership of the NGCC comprises the Secretary Generals and State Secretaries. In addition, the Chair of NGCC can also invite Chair or President of Geospatial Private Sector Association and Chair or President of Geospatial Academic Network to be committee members.

NGCC's objectives are as follows:

- To coordinate activities related to the management of the country's geospatial programmes, the development of the NSDI, and the implementation of the Geospatial Policies and Acts.
- To become a research joint venture platform and also a spatial science frontiers with cooperation from the universities, researchers, government agencies, private sector and international organisations.

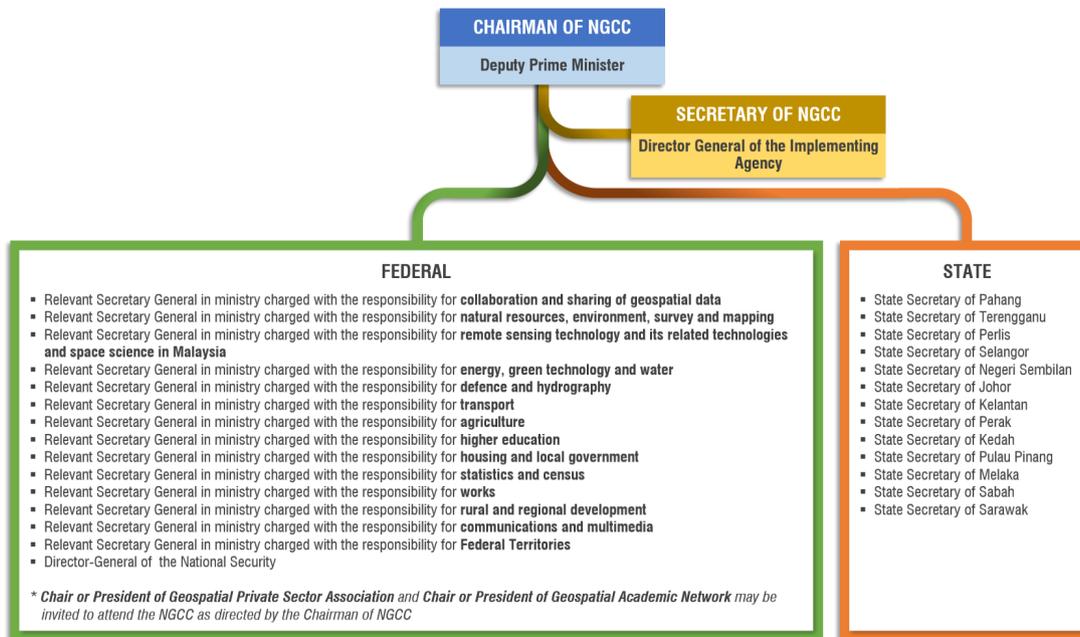


Figure 13 Proposed Structure of National Geospatial Coordinating Committee (NGCC)

National Geospatial Governance Workflow

The National Geospatial Governance Workflow, as illustrated in *Figure 14*, can be viewed as a framework that enables communication among the NGC, NGCC, NGTC, the Implementing Agency and geospatial users to manage their collective affairs through a process of negotiation and decision-making.

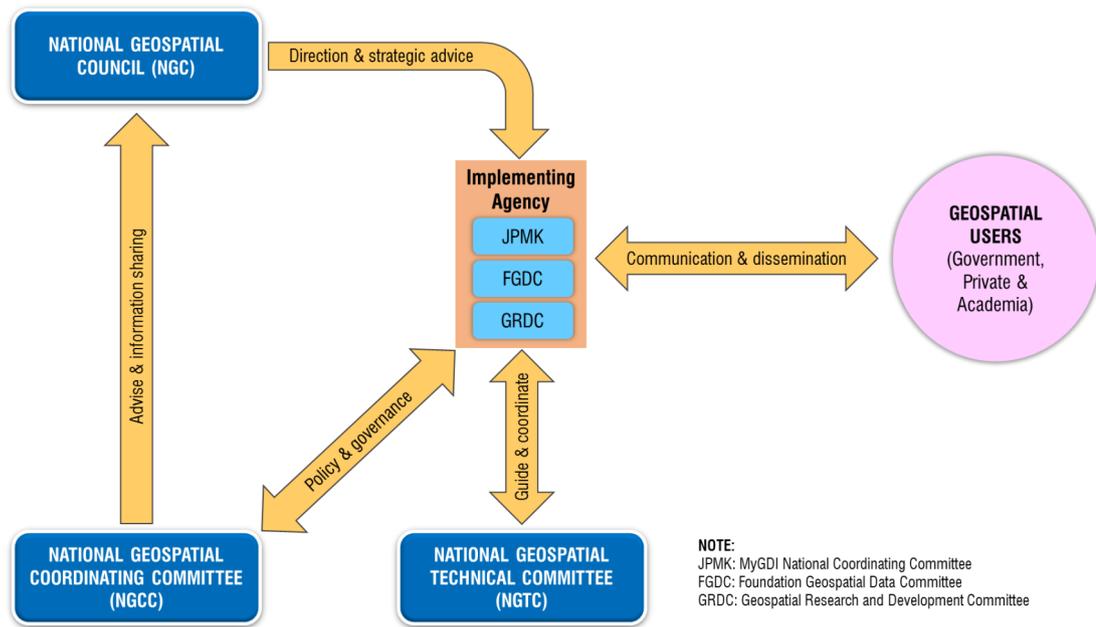


Figure 14 National Geospatial Governance Workflow

3 - NATIONAL GEOSPATIAL ACT

An Act to provide for the establishment of the National Geospatial Council, the collaboration, utilisation, sharing and visualisation of geospatial data, the development of geospatial data infrastructure and research capacity and to provide for matters incidental thereto.

Essentially, the components of the Proposed Act consist of (i) the establishment of the NGC; (ii) the appointment of a Director General of National Geospatial (Director General); (iii) the obligation imposed on data custodians to adhere to Malaysian Standards for geospatial data; (iv) the sharing of geospatial data and foundation geospatial data; (v) the establishment of a Geospatial Research and Development Committee (R&D Committee); and (vi) provisions relating to enforcement in situations of non-compliance with the Proposed Act (the Components of the Proposed Act).

Component (i) of the Proposed Act: Establishment of the National Geospatial Council

In relation to the functions of the NGC, the Proposed Act states that the NGC shall have the following functions, namely (a) to formulate, approve, review, monitor and promote a national geospatial policy and strategic plan; (b) to co-ordinate and advise government entities relating to national geospatial matters; and (c) to perform any other functions for the proper implementation of the Proposed Act.

The NGC shall have the power to (a) carry out all activities which appear to the NGC to be requisite, advantageous, convenient, for or in connection with the performance of its functions; (b) to require the furnishing of information by any government entity or person to assist the NGC in the performance of its functions; (c) to appoint or engage such agents, experts or consultants as it deems fit to assist the NGC in the performance of its functions; and (d) to do anything incidental to its functions under the Proposed Act.

Component (ii) of the Proposed Act: Appointment of the Director General

The proposed Act establishes the powers, duties and functions of the Director General. Similar to the NGC, the powers and functions of the Director General are mainly administrative in nature.

Component (iii) of the Proposed Act: Standards for Geospatial Data

The Proposed Act states that a data custodian who shares geospatial data shall ensure that the data complies with the relevant Malaysian Standards or any other standards as may be recognized by the Minister.

Component (iv) of the Proposed Act: The sharing of geospatial data and foundation geospatial data amongst government entities

Geospatial data and foundation geospatial data consist of, among others, data pertaining to natural or constructed features on the surface and subsurface of the earth.

Component (v) of the Proposed Act: Establishment of the Geospatial Research and Development Committee

In relation to the functions of the R&D Committee, R&D Committee shall:

- co-ordinate the research and development activities relating to geospatial data;
- determine the priorities for the research and development and funding activities relating to geospatial data; and
- develop and monitor a research, development and capacity building establishment and commercialisation model for activities relating to geospatial data.

Component (vi) of the Proposed Act: Provisions relating to enforcement in situations of non-compliance with the Proposed Act

It is established that provisions relating to enforcement and investigation would come under the purview of Item 4 of the Federal List which deals with civil and criminal law and procedure and the administration of justice.

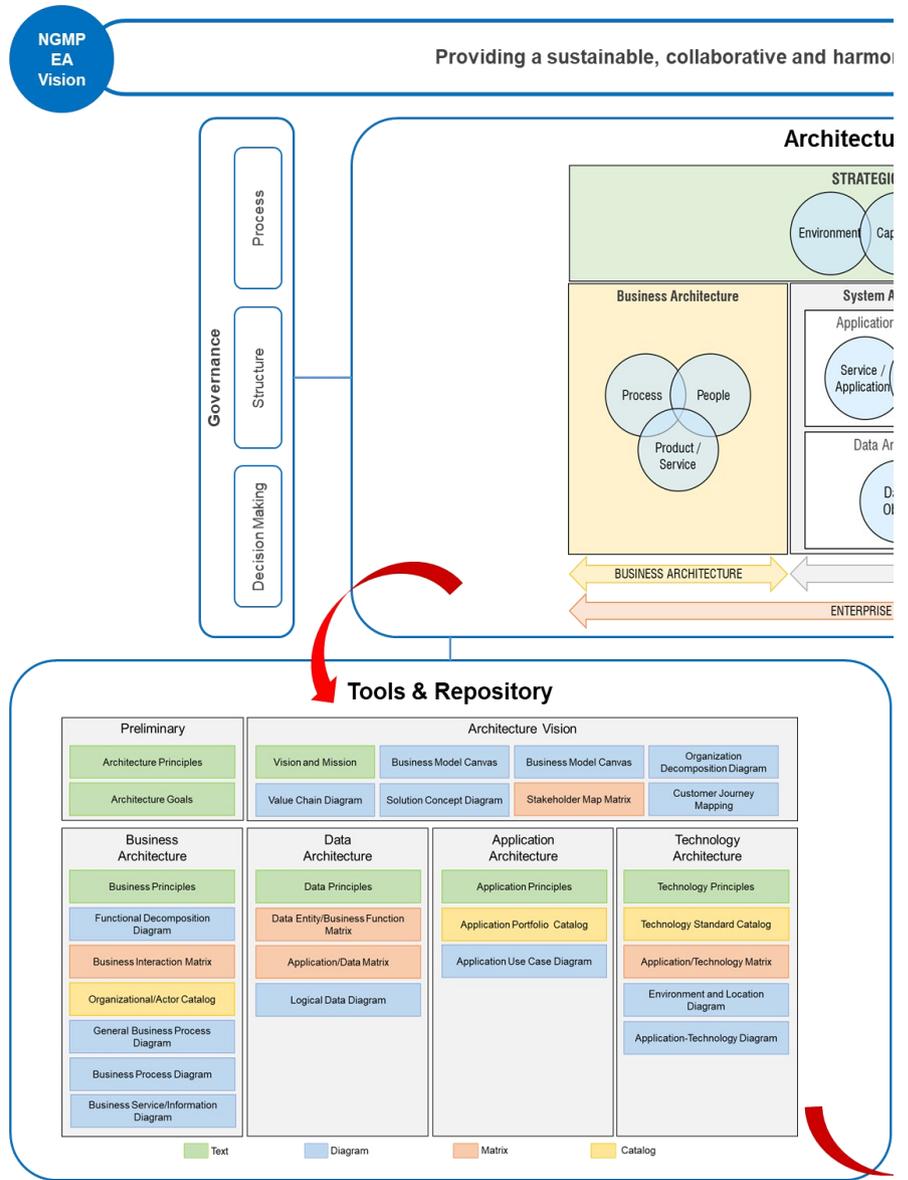
4 - NATIONAL GEOSPATIAL ENTERPRISE ARCHITECTURE FRAMEWORK

National Geospatial Enterprise Architecture (EA) is a holistic approach to improve the effectiveness, efficiency, and agility of geospatial services in an agency.

Geospatial EA is a blueprint on how the organisation achieves the geospatial business objectives at hand and in the future. The National Geospatial EA Framework defines the set of components which consist of vision, principles, architecture domains, governance, methodology, tools and repository. This is consistent with the 1GovEA Framework that was developed to define the core architecture elements in building and operating EA practices. The National Geospatial EA Framework is as depicted in *Figure 15*. This framework will be as reference to the government agency to develop their EA and document their current and wished-for relationship among business and management processes and information technology (IT).

The National Geospatial EA Framework Life Cycle

- The framework comprises of **6 main components**

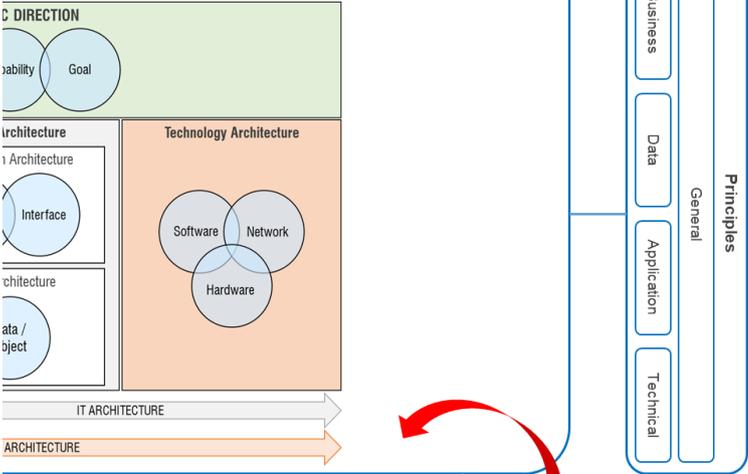


Fundamentals of 1GovEA

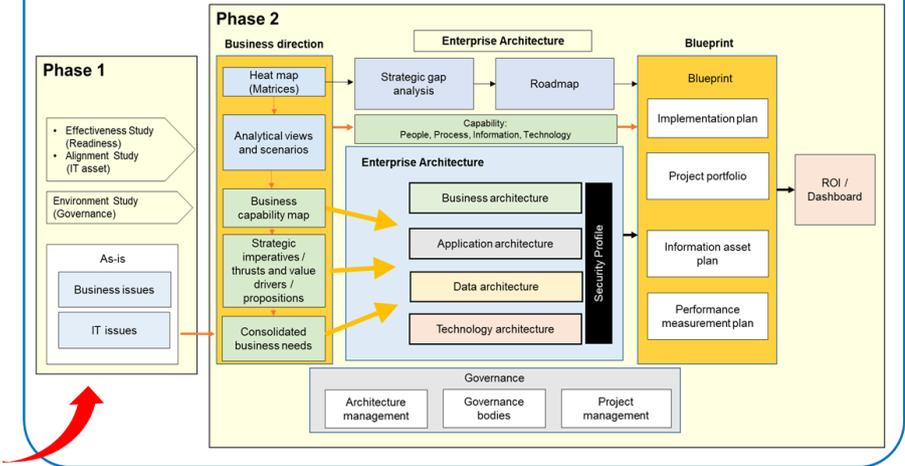
Figure 15 The National Geospatial EA Framework

envisaged environment to support reliable geospatial services”

Core Domains



Methodology



FRAMEWORK

National Geospatial EA Framework Component

The definition of each of the EA framework components is as shown below:

Vision

A statement of intent that promotes the ultimate aim behind the establishment of National Geospatial EA initiative.

Principles

The overarching architecture standards to guide geospatial related agencies in the development of the geospatial business and technical architecture.

Architecture Domains

The four areas of architecture namely, business, data, application and technology that needs to be developed and maintained as the geospatial related agencies embark on building the Geospatial EA practices.¹

Governance

The recommended structure and operating model that needs to be put in place to support the implementation and operationalisation of EA practices.

Methodology

The structured approach (e.g. stages and steps) to be adopted by the geospatial related agencies when developing their Geospatial EA practices.

Tools and Repository

The recommended tools and the common repository structure adopted by geospatial related agencies for documenting artefacts.

Vision, Mission, Goal and National Geospatial Objectives

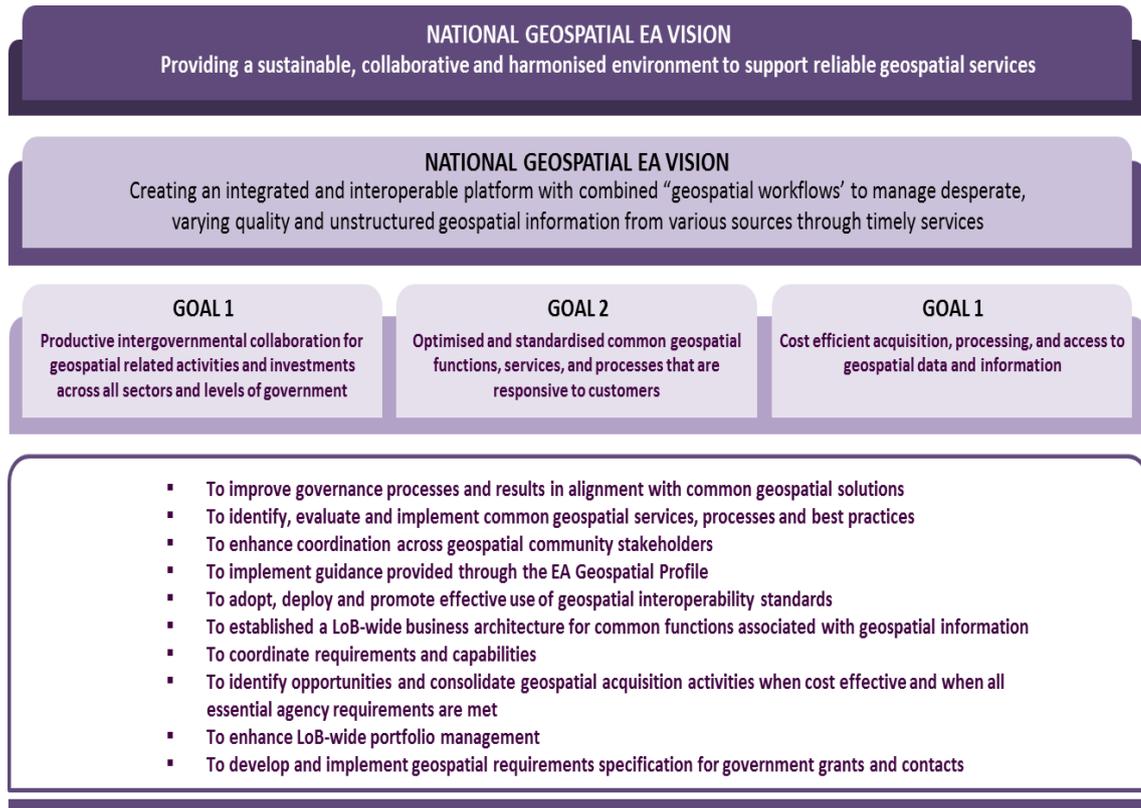


Figure 16 National Geospatial EA Vision, Mission, Goal and Objectives

National Geospatial EA Principles

National Geospatial EA principles adopt 12 1GovEA architecture principles and introduce 11 additional principles to guide the development and implementation of Geospatial EA.

¹ Blueprint for 1Government Enterprise Architecture: A Quick Guide to 1GovEA, MAMPU (1GovEA, page 9)

Table 1 Applicability Mapping between 12 1GovEA Architecture Principles and National Geospatial EA Principles

National Geospatial EA Principles	1GovEA Architecture Principles											
	Interoperability	Common Language	Maximise Benefits to the Organisation	Information Management is Every-body's Responsibility	Business Led Change	Data is an Asset	Embedded Security Standards	Data is Both Shared and Accessible unless Confidential	Application are Easy to Use	Common Use Application	Technology is Independent from Applications	Business Resiliency and Continuity
	General		Business		Data		Application		Technology			
1. Information as an Asset			X		X	X		X				
2. Value and Risk Classification			X		X	X	X					X
3. Single Version of Truth	X	X		X				X	X	X		
4. Minimum Quality	X		X			X		X			X	
5. Information has Authoritative Sources				X	X		X	X				
6. Information Security				X			X					X
7. Information Accessibility	X	X	X		X			X	X	X	X	
8. Data Ownership				X		X		X				
9. Data Stewardship				X								
10. Metadata Driven		X						X	X	X	X	
11. Measurement for Quality			X					X				X

The Architecture Domains

The Geospatial EA includes the key business information, application and technology strategies and their impact on business functions. Each of these strategies is a separate architectural discipline and Geospatial EA is the glue that integrates these disciplines into a cohesive framework as illustrated in *Figure 17*.

- **Strategic Direction and Drivers** – The Implementing Agency’s Strategic Direction and Architectural Drivers set the foundation on which the EA is developed. A high-level view of the Implementing Agency’s Architectural Drivers, both internal and external and NGMP, mandates that influences from the EA and architectural decision-making process are factored in.

- **Architectural Layers** – The EA provides the details of the Implementing Agency’s performance, business, data, application, infrastructure and security layers. Each layer provides a different perspective on the current and target environments.
 - Strategic Direction – Business Planning;
 - Business Architecture – Business Operations;
 - Systems Architecture – Automation; and
 - Technology Architecture – Technology Infrastructure.

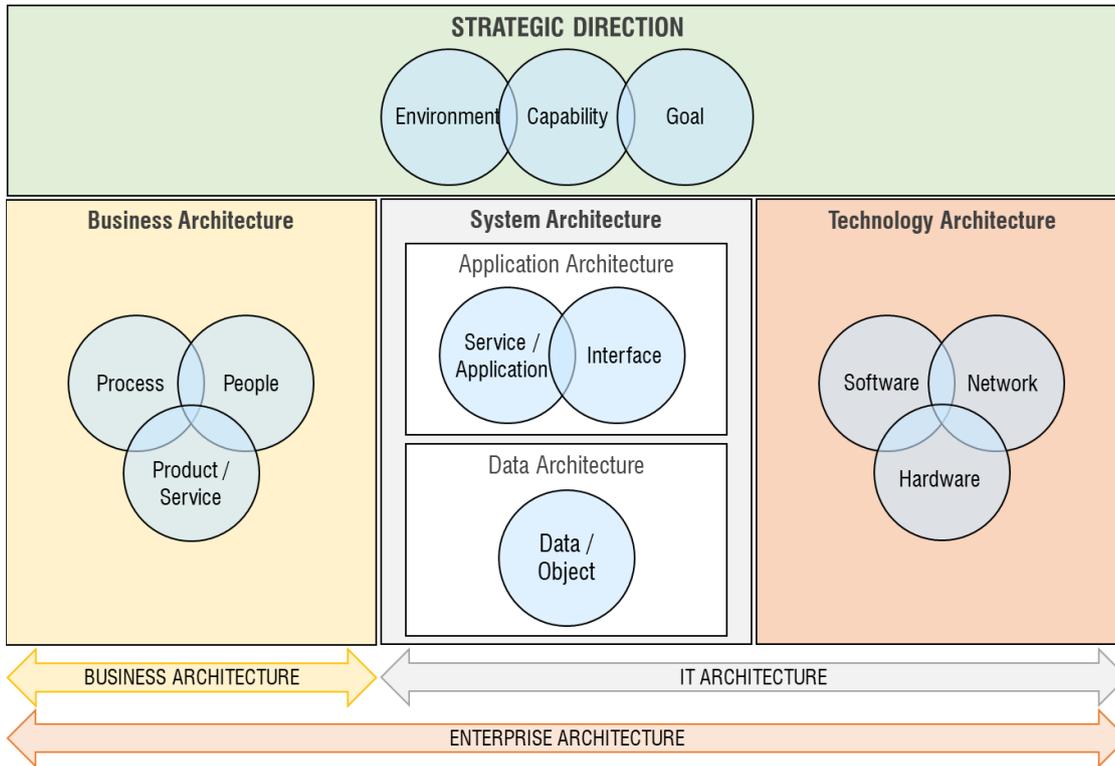


Figure 17 Domains²

² <https://www.slideshare.net/.../optimizing-value-to-the-enterprise-with-integrated-enter...Apr 22, 2008-Optimizing Value to the Enterprise with Integrated Enterprise Architecture> Brian James Director of Product Management Metastorm

National Geospatial EA Governance

EA Governance is the structure by which an enterprise defines proper strategies and ensures development alignment with the strategies.

■ EA Governance at Implementing Agency

In the Implementing Agency organisation structure as shown in *Figure 18*, National Geospatial EA will be carried out by the proposed Geospatial Services Division and Geospatial Infrastructure Division. However, the Head of Geospatial Services Division is responsible as the Chief Architect.³

■ Programme Staffing Resources

The Chief Architect is responsible for the planning, budgeting and overall management of the EA practice and its staff. The National Geospatial EA Practice should be led by the Chief Architect, with the EA staffs being assigned various tasks, to ensure cross-coverage and continuous exchange of knowledge and skills.

³ Rangka tindakan 1Government *Enterprise Architecture* (1GovEA): Panduan Ringkas 1GovEA, MAMPU

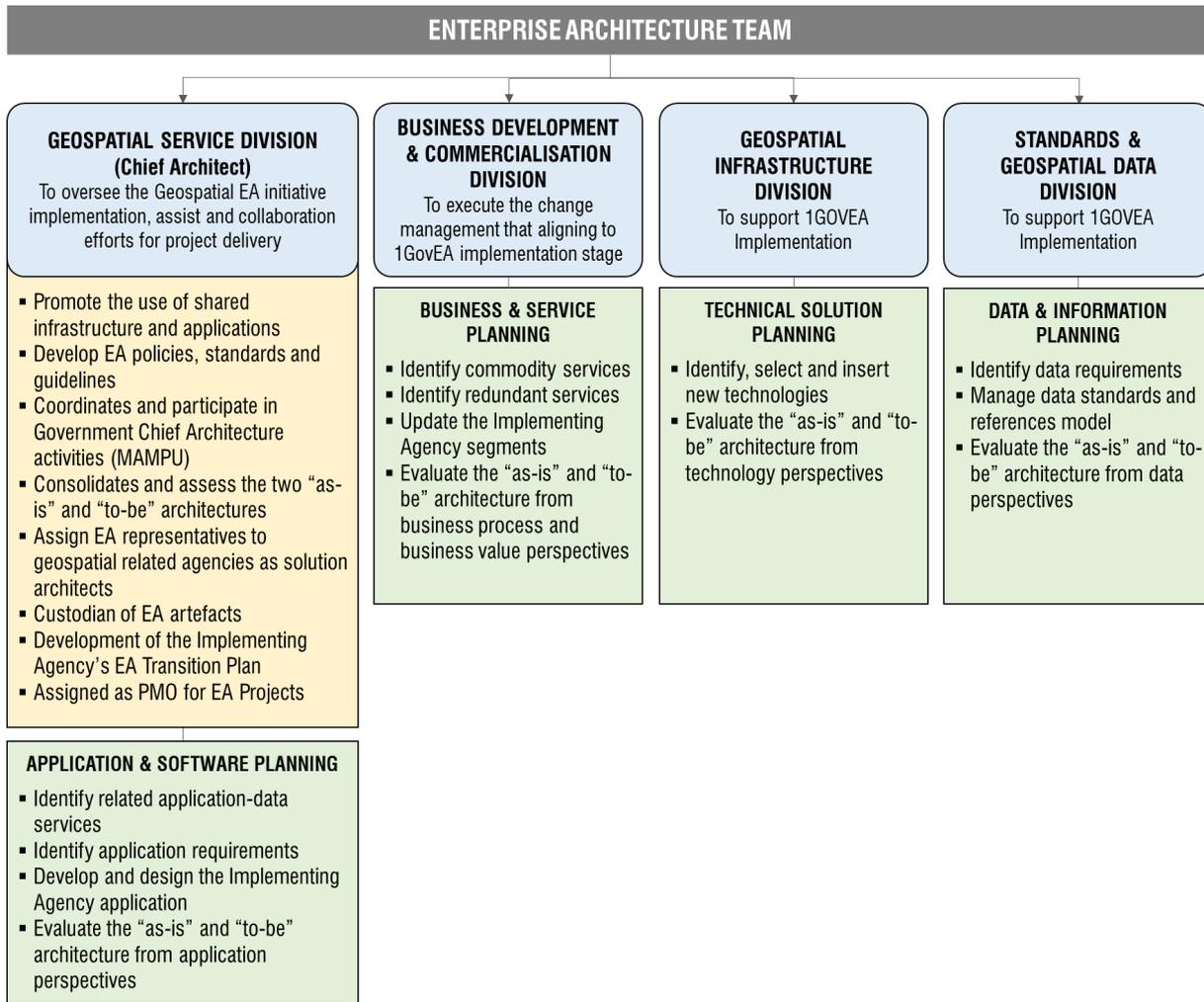


Figure 18 EA Practice Functional Chart for the Implementing Agency

National Geospatial EA Methodology

The study methodology for the National Geospatial EA Framework is carried out in two phases: Phase 1 is the assessment stage while Phase 2 is the blueprint designing stage as shown in *Figure 19*.

Phase 1: Assessment

- Assessment of current ICT initiatives, which includes:
 - The Malaysian Public-Sector ICT Strategic Plan 2016-2020; covering the national ICT strategy.
 - NRE ICT Strategic Plan 2016-2020; covering the ICT strategy for the agencies under NRE.
 - Blueprint for 1Government Enterprise Architecture (1GovEA); covering the national EA framework.
- Alignment of EA for NGMP with the findings from National Geospatial Strategic Plan

Phase 2: Designing Blueprint

- Business Architecture: Assessment of the current business environment and future business model.
- System Architecture that consist of:
 - Application Architecture – Assessment of current and future application and software project/portfolio.
 - Data Architecture – Assessment of current and future information model applications.
- Technology Architecture – Assessment of current technology environment and future technology.
- Governance model for the implementation of EA for NGMP.

The deliverable under Phase 2 is the draft EA Blueprint for NGMP.

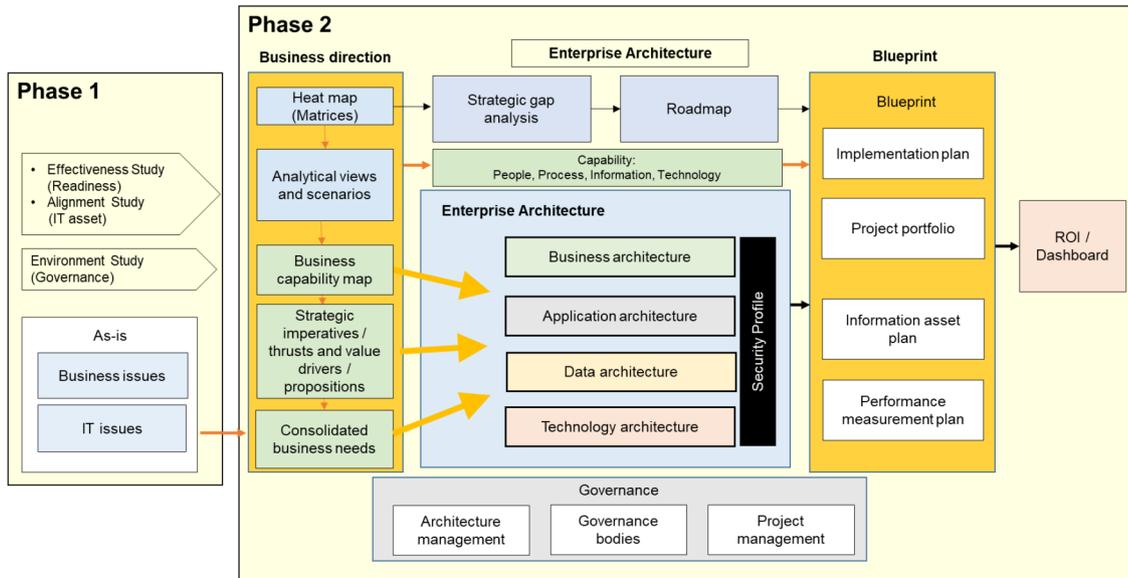


Figure 19 EA Methodology

National Geospatial EA Tools and Repository

Figure 20 illustrates the EA Major Artefacts derived from Architecture Domain which consist of the following:

- Catalogues are specific foundational viewpoints that represent lists of building blocks.
- Matrices are specific foundational viewpoints that show the relationships between building blocks of specific types.
- Diagrams are graphical viewpoints that present building blocks in a rich and visual way, more suitable to stakeholder communication.

Enterprise Architecture (Tools & Repository)

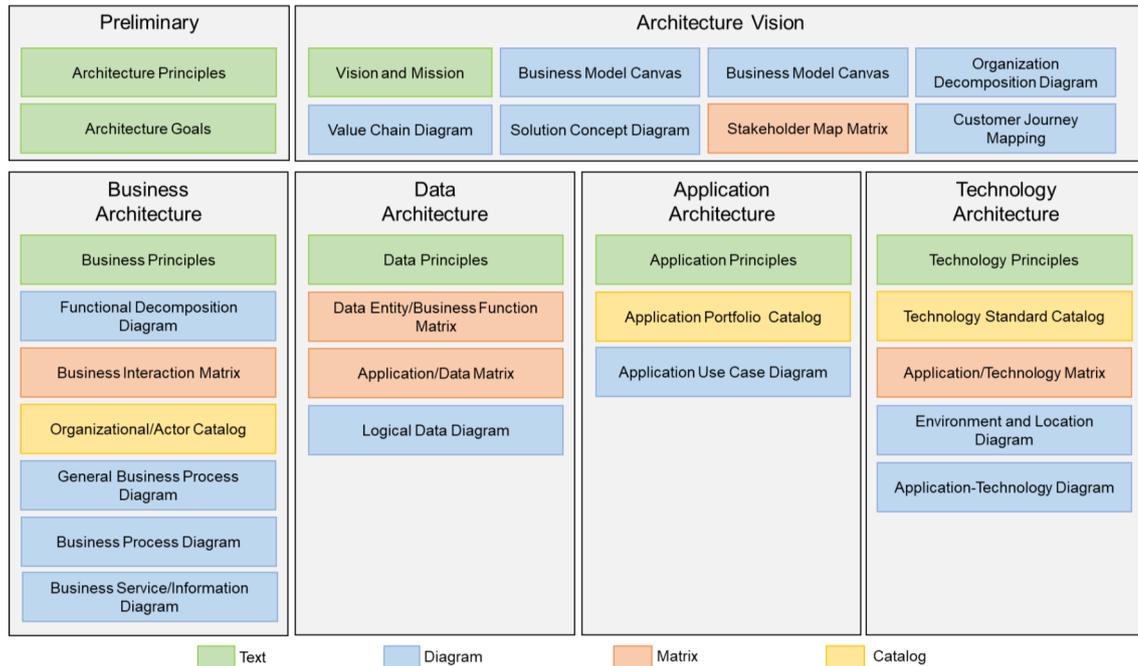


Figure 20 EA Major Artefacts

The architecture viewpoints can be derived from the Architecture Domains to produce views as follows:

- The Business Architecture domain addresses the needs of users, planners and business management.
- The Data Architecture domain addresses the needs of database designers, database administrators and system engineers.
- The Application Architecture domain addresses the needs of system and software engineers.
- The Technology Architecture domain addresses the needs of acquirers, operators, administrators and managers.

5 - NATIONAL GEOSPATIAL STRATEGIC PLAN

The approach and methodology applied to develop the NGSP are based on three stages;



The NSP is also developed based on the three guiding principles to guide geospatial industry development throughout all stages of growth, despite the changes in its goals, strategies and leadership. The guiding principles are:

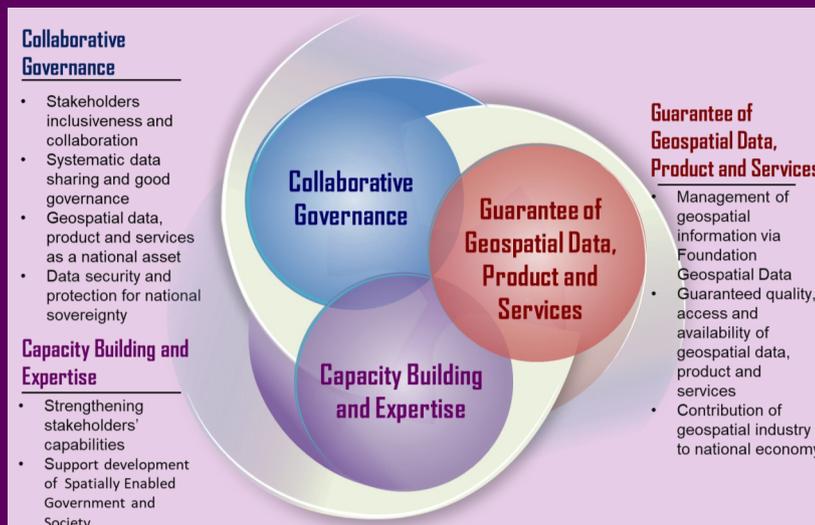


Figure 21 Guiding Principles

In order to ensure cohesive development of the geospatial industry, it is important that all key players within the ecosystem are guided by a set of core values when it comes to decision-making processes. The cover values identified are:

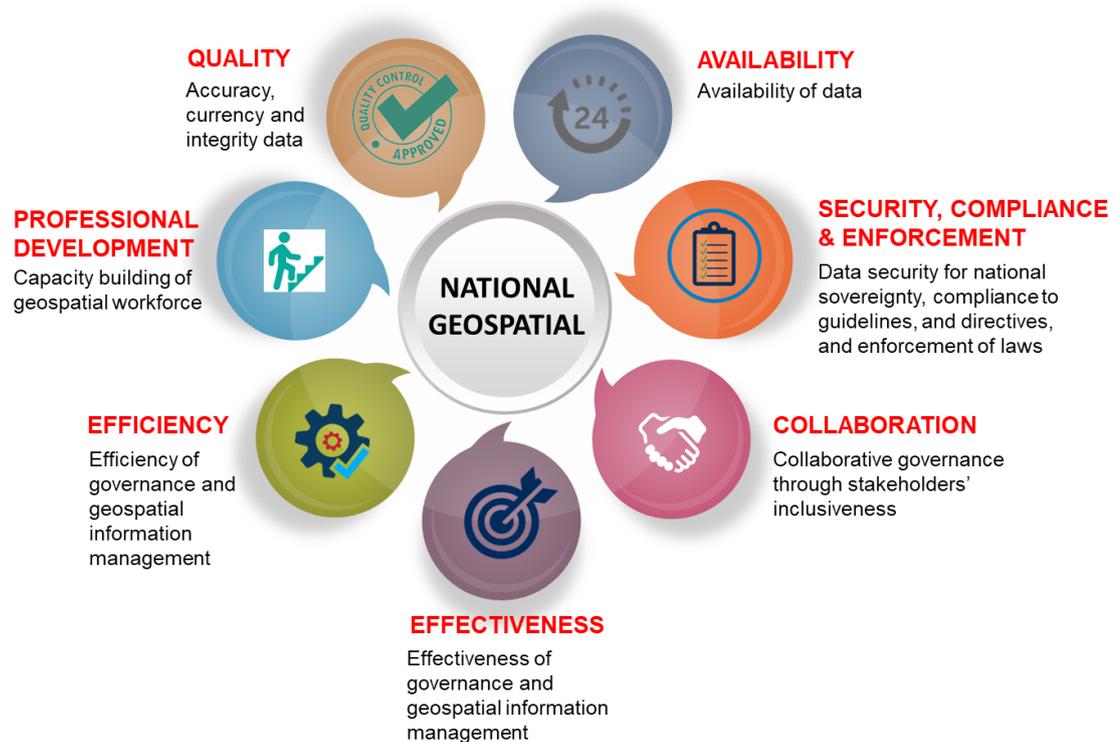


Figure 22 Core Values

Recommended Strategic Plans

In the Initial Assessment stage of the NGSP development, some key challenges were identified throughout the national geospatial strategies and projected implementation journey. These challenges include lack of policy and governance; issues in data quality and accessibility; lack of commercialisation and sustainability for R&D efforts, products and services; and lack of skilled and sustainable talent pool.

In view of these challenges, the NGSP is proposing a comprehensive and inclusive solution towards geospatial industry development by recommending four strategic plans, while at the same time addressing the six strategic thrusts set by the National Geospatial Policy (NGP).

The four strategic plans, which are also the main pillars of the NGMP are:



■ SP1 – Effective Policy and Strong Governance

Effective policy and strong governance is crucial in developing the national geospatial industry. All stakeholders in the industry need to adhere to established guidelines and procedures. SP1 is recommended as one of the main pillars of NGMP to address Thrust 1 of the NGP; National Geospatial Governance, as well as Thrust 4; Monitoring Implementation of Geospatial Policy and Geospatial Act at National Level.

There are four focus areas identified within SP1, which cover policy creation, policy implementation, legislation and compliance. In order to serve these focus areas, three initiatives have been identified for SP1, which include the Establishment of National Geospatial Policy, Governance and EA; Establishment of National Geospatial Act; and Establishment of NGMP Management, Monitoring and Audit.

Six programmes are recommended for the implementation of these three initiatives. These programmes are Geospatial Governance and Policy Implementation; Development of National Geospatial EA Master Plan (for Implementing Agency); Adoption of Geospatial Data Licensing; National Geospatial Communication and Outreach (Policy, Strategic Plan and EA); Geospatial Act Enactment and Enforcement; and NGMP Implementation Performance Monitoring.

The above initiatives and programmes are developed to achieve the objectives of SP1 which is to develop a well-defined policy framework and governance structure for all stakeholders; to effectively implement policy framework and procedures; to develop legislation framework based on a National Geospatial Act; to develop compliance framework based on a National Geospatial Act and standards. Successful implementation of these initiatives and programs will equip the national geospatial industry with effective policy and strong governance.

Strategic Plan (SP)

**National Geospatial Policy
Objectives and Thrusts Covered**

Objective 1:

To strengthen the direction and strategy for joint action so that the sharing of geospatial content is systematic through effective and efficient management and good governance.

Thrust 1:

National Geospatial Governance

Objective 4:

To realise the National Geospatial Agenda that supports national economic transformation through Spatially Enabled Government and Society.

Thrust 4:

Monitoring Implementation of Geospatial Policy and Geospatial Act at National Level

Objective 5:

To ensure that the laws, guidelines and directives related to geospatial are complied with and implemented by all stakeholders.

SP1: Effective Policy and Strong Governance

■ SP2 – Seamless Data/Information Access and Usage

Secured access and usage seems to be the main concern in terms of data sharing. Stakeholders also tend to have their own standards and formats when it comes to data storage. This is where SP2 comes in – by providing a secure infrastructure and standardized business process and service delivery to address Thrust 2 of the NGP; Efficient and Effective National Geospatial Data Infrastructure and Thrust 6; Ease of Access to Geospatial Information and Seamless Data Sharing.

There are four focus areas identified for SP2, which cover data availability, quality, security and interoperability. In order to serve these focus areas, three initiatives have been identified for SP2, which are Establish Business Process; Establishment of Service Delivery (National Geospatial Flagship Project); and Secured Spatial Platform Services.

Eight programmes are recommended for the implementation of these three initiatives, which are Geospatial IT Governance; Change Management; Stakeholder Relationship Management; Geospatial Standards; Pilot Project for National Geospatial Flagship (Next Generation Geospatial Data Infrastructure); Service Delivery – Shared Data Catalogue and Foundation Geospatial Data (FGD) Services; NextGen Training; and Secured Geospatial Infrastructure.

The above initiatives and programmes are developed to achieve the objective of SP2 which is to provide a secured and shared platform, while ensuring the quality and availability of geospatial information, products and services through best practices, current standards and ease of access.

Strategic Plan (SP)	National Geospatial Policy Objectives and Thrusts Covered	
SP2: Seamless Data/ Information Access and Usage	<p>Objective 3:</p> <p>To provide a shared platform to ensure and guarantee the quality and availability of geospatial information, products and services through best practices, current standards and ease of access.</p>	<p>Thrust 2:</p> <p>Efficient and Effective National Geospatial Data Infrastructure</p> <hr/> <p>Thrust 6:</p> <p>Ease of Access to Geospatial Information and Seamless Data Sharing</p>

■ SP3 – Agile Research-Industry Ecosystem

The geospatial industry players need proper motivation and support from the ecosystem to pursue Research, Development and Commercialisation (R&D&C), innovation and value creation activities. An effective way of motivating and supporting the industry players is by encouraging collaboration among government, academia and private sectors. In order to collaborate effectively and efficiently, a clear and feasible business model needs to be established. This is what SP3 aims to do by addressing Thrust 3 of the NGP; Agile Geospatial Business Model.

There are two focus areas identified for SP3, which cover R&D&C and ecosystem support. In order to serve these focus areas, two initiatives have been identified for SP3, which are Strengthening of R&D&C Ecosystem; and Industry Development (Private Sector Focus). Three programmes are recommended to implement these initiatives, which are Geospatial Research and Development Committee (GRDC) Establishment and Implementation; Establishment of National Geospatial Centre of Excellence (NGCoE) and Spin-Off; and Private Sector Inclusion Strategy.

The successful execution of the above initiatives and programmes will provide a highly conducive environment for continuous geospatial research activities, as well as create a supportive and vibrant ecosystem for local private sectors to venture and grow in the local geospatial industry. This will ultimately establish an agile research–industry ecosystem for the national geospatial industry.

Strategic Plan (SP)

**National Geospatial Policy
Objectives and Thrusts Covered**

SP3: Agile Research-
Industry Ecosystem

Objective 6:

To encourage research and development through academic networks, promote innovation in government, and support commercialisation for private sector opportunities.

Thrust 3:

Agile Geospatial Business Model

■ SP4 – Sustainable and Competent Talent Pool

The industry definitely requires a sustainable and competent talent pool in order to grow. The national geospatial talent pool needs to be equipped with up-to-date skills and knowledge and there also needs to be a good sustainable talent pool for long term growth. Hence, SP4 aims to address Thrust 5 of the NGP; Competent Human Resources with Varied Skills and Innovation. Two focus areas have been identified for SP4, which cover geospatial capacity and capability development; and workforce demand. Two initiatives have been identified to serve the focus areas; which are Geospatial Capacity and Capability Development; and Geospatial Workforce Demand Planning.

Within these initiatives, there are five recommended programs, which are Geospatial Human Resource Transformation and Management; Streamlining Certification Through Professional Bodies; Geospatial Program Accreditation; Capacity Building for Geospatial Innovation; and Geospatial Manpower Supply Pool Development.

The initiatives and programmes outlined for SP4 will assist in strengthening organisational capacity for geospatial, establishing an innovation infrastructure and building sustainable relationships through collaborative projects. They would also address current and future manpower needs for the national geospatial industry.

Strategic Plan (SP)	National Geospatial Policy Objectives and Thrusts Covered	
SP4: Sustainable and Competent Talent Pool	<p>Objective 2:</p> <p>To build and strengthen stakeholders' ability in an effective and inclusive manner by focusing on human resources, technology, standards and best practices.</p>	<p>Thrust 5:</p> <p>Competent Human Resources with Varied Skills and Innovation</p>

Implementation Strategy

The NGSP is a long-term plan over the span of 10 years. It is recommended to be carried out in three phases (Figure 23).

The recommended initiatives and programmes within each phase are carefully laid out throughout the three phases to allow for a healthy and sustainable growth of the national geospatial industry. The NGSP also takes into account the realistic progression of stakeholders' acceptance, talent pool transformation and market readiness.

The NGSP also clearly highlights those “quick wins”, which refers to programmes that are fundamental and relatively easy to be implemented immediately, while at the same time creating impact and alignment within the Build and Establish phase.



Figure23 NGSP Implementation Phase

The “quick wins” programmes are:

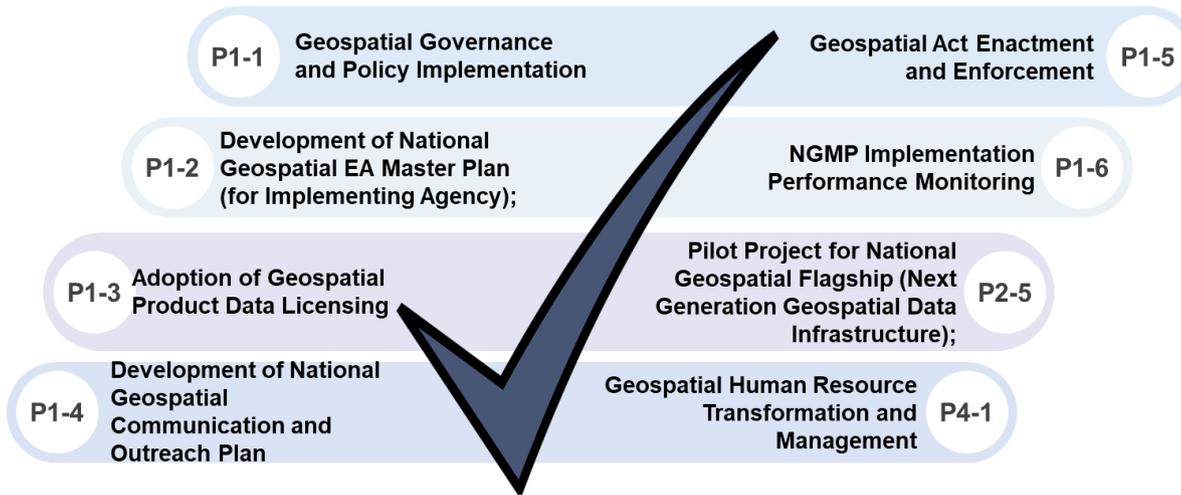
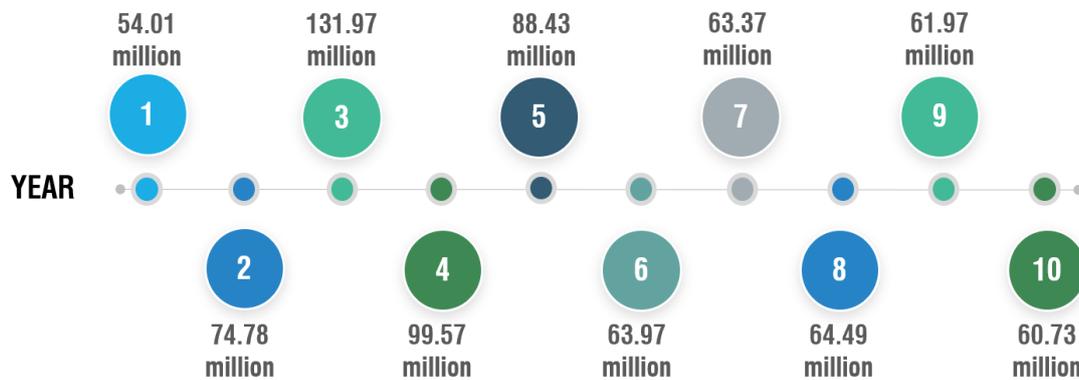


Figure 24 “quick wins” programmes

The projected budget for the NGSP is RM763.28 million, with RM190.40 million (24.94%) allocated for the implementation of “quick wins” programmes throughout the 10-year period.



On the commercial front, a separate entity called the National Geospatial Centre of Excellence (NGCoE) is proposed to be formed as a company-limited-by-guarantee. This means the NGCoE will be wholly-owned by the government, non-profit but having the financial and operational flexibility of a privately incorporated entity. It will be the vehicle for the Implementation Agency to provide capacity building, innovation and R&D services via a collaborative business model. The NGCoE will collaborate closely with government, academia and private sectors by sharing and leveraging on each other's resources and expertise. By nature of its formation as a company-limited-by-guarantee, NGCoE will be able to create value, innovation and operate revenue generating activities.

All of the above implementation activities will be governed by the proposed National Geospatial Act and Policy. Effective guidelines, procedures and KPIs will be critical to provide good governance, mark clear roles and responsibilities of each key stakeholders, as well as to motivate high compliance level among them.

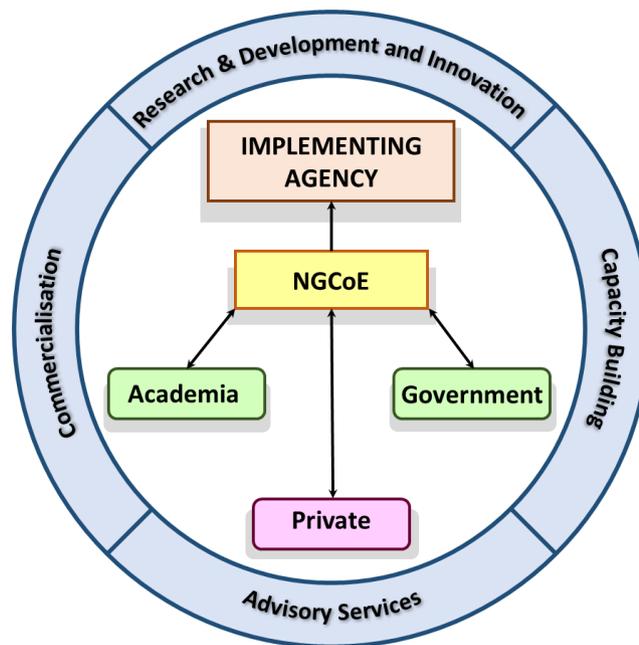


Figure 25 Interaction by Implementing Agency through NGCoE (National Geospatial Centre of Excellence) with federal/state government agencies, private sectors, and academia for services

SUMMARY OF STRATEGIC PLAN PROGRAMMES

Strategic Plan	Programme ID	Programme	Guiding Principles		
			Collaborative Governance	Guarantee of Geospatial Data, Product and Services	Capacity Building and Expertise
SP1 - Effective Policy and Strong Governance	P1-1	Geospatial Governance and Policy Implementation	◆	◆	◆
	P1-2	Development of National Geospatial EA Master Plan (for Implementing Agency)	◆	◆	
	P1-3	Adoption of Geospatial Data Licensing	◆	◆	
	P1-4	National Geospatial Communication and Outreach Plan	◆	◆	◆
	P1-5	National Geospatial Act Enactment and Enforcement	◆	◆	◆
	P1-6	NGMP Implementation Performance Monitoring	◆	◆	◆
SP2 - Seamless Data/Information Access and Usage	P2-1	Geospatial IT Governance	◆	◆	◆
	P2-2	Change Management	◆	◆	◆
	P2-3	Stakeholder Relationship Management	◆	◆	◆
	P2-4	Geospatial Standards	◆	◆	◆
	P2-5	Pilot Project for National Geospatial Flagship (Next Generation Geospatial Data Infrastructure)	◆	◆	
	P2-6	Service Delivery - Shared Data Catalogue and Foundation Geospatial Data (FGD) Services		◆	◆
	P2-7	NextGen Training	◆	◆	◆
	P2-8	Secured Geospatial Infrastructure	◆	◆	◆
SP3 - Agile Research - Industry Ecosystem	P3-1	Geospatial R&D Committee Establishment and Implementation (GRDC)	◆	◆	◆
	P3-2	Establishment of National Geospatial Centre of Excellence (NGCoE) and Spin-Off		◆	◆
	P3-3	Private Sector Inclusion Strategy	◆	◆	◆
SP4 - Sustainable and Competent Talent Pool	P4-1	Geospatial Human Resource Transformation and Management	◆	◆	◆
	P4-2	Streamlining Certification through Professional Bodies and Associations		◆	◆
	P4-3	Geospatial Program Accreditation	◆	◆	◆
	P4-4	Capacity Building for Geospatial Innovation	◆	◆	◆
	P4-5	Geospatial Manpower Supply Pool Development	◆		◆

- ◆ Main
- ◆ Secondary
- Quick Win

CRITICAL SUCCESS FACTORS

The implementation of NGMP very much depends on the acceptance of NGMP among key stakeholders. By accepting the overall NGMP, the stakeholders will then need to specifically align their business objectives to the NGMP vision and mission. Therefore, clear communication among stakeholders is crucial to ensure the stated intents and goals are well understood and accepted. Other than being clear, communication with stakeholder must also be continuous to sustain their interest and garner cooperation.

Good governance and compliance are also key areas that will determine the success of the NGMP. Good governance is important to promote a high level of compliance among the stakeholders and implementers. Standard Operating Procedures (SOPs) and KPIs need to be well communicated and documented for effective performance monitoring and tracking of each programme and stakeholders' participation.

In order for the geospatial industry to grow, it also requires sizeable and sustainable market demand and supply of geospatial solutions and resources. Demand may be generated via market promotion activities to attract investment and collaboration opportunities. Sufficient supply of solutions and resources, including funds are also important to sustain generated demand and interests which will lead to industry growth.

Availability and accessibility of geospatial data sets, as well as seamless and secured system infrastructure are two of the most fundamental resources required successfully implement the NGMP. Data must be compliant to the established standards, while the seamless and secured system must also allow ease of use and good user experience.



A NEW BEGINNING

The National Geospatial Master Plan signifies a new beginning in an effort to bring national geospatial development to the next level. This would require a differentiated approach with the overall vision of the NGMP of creating a new geospatial ecosystem that are globally competitive. The five High Impact Enablers are critical in making the NGMP a success, together with other complementary measures to address current constraints to growth of geospatial in Malaysia.

The NGMP would be driven by the private sector and academia while the Government will take the role as a regulator and catalyst in creating and enabling the environment required for geospatial development. The NGMP also identifies common and specific risks with regards to the Strategic Plans and each programme, along with the recommended mitigation strategies to assist in overcoming identified challenges and constraints throughout the implementation of the NGMP.

Programmes will be monitored, evaluated and fine-tuned to optimise their outcomes and provide the basis for effective policy making. With such a comprehensive framework in place, the key challenge now lies in the implementation of the NGMP which will require a shift in the mindset of all stakeholders in the NGMP to make this a reality.

The newly proposed elements within the NGMP, such as the National Geospatial Act and Policy, the Implementing Agency, the NGC and Committees, the four pillars of the strategic plans and quick win programmes are among the highlights that will be the game changer to take the national geospatial industry to the next level.





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