

**NATIONAL GEOINFORMATION POLICY
(DRAFT)**

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EXECUTIVE SUMMARY

Preamble

Geospatial Information (GI) is very essential to economic planning and national development and is universally regarded as a critical national resource. Geospatial Information is very vital to the development of various sectors of the economy such as Petroleum, Solid Minerals, Forestry, Agriculture and Food Security, Land Administration, Transport and Aviation, Environment, Security and Defense, Tourism, Census, Health, and Water Resources. Over 80 percent of planning and decision making processes are based on GI, which is then applied to obtain solutions to a wide variety of economic, social and environmental problems.

In Nigeria at the moment, GI is acquired and stored in analogue form by various agencies of government such as Ministry of Works and Housing and Ministry of Environment, and by the private sector for their own use and applications with attendant problems of unnecessary overlaps and duplication, lack of accessibility, and varying standards and formats. There is no coordinated production, management and dissemination of geospatial datasets that are commonly used by many agencies. Neither is there any policy for data quality, access, sharing and exchange.

Due to the increasing awareness of the use of GI for decision-making over the past years, coupled with the expected availability of primary dataset from the Nigerian Satellite, the country has realized the need to adopt policies for promoting greater awareness and public access to standard and coordinated geo-spatial data production, management and dissemination by all sectoral institutions and the need for the establishment of a Geospatial Data Clearinghouse at various levels in the country (local, state and federal) and linkages with the private sectors.

The establishment of a National Geospatial Data Infrastructure (NGDI) backed by a National Policy will certainly eliminate most of the problems experienced by geoinformation producers and users in Nigeria today.

An efficient functioning NGDI and the associated National Policy should be regarded as vital requirements for sustainable national development.

Vision Statement

To enhance optimal use of Geospatial Information as a critical resource in all phases of sustainable national development for the alleviation of poverty and improvement of quality of life of the people of Nigeria by establishing and maintaining a National Geospatial Data Infrastructure (NGDI).

Mission Statement

The mission of the NGDI is to:

- Facilitate cooperation and collaboration among stakeholders in generating Geospatial databases, which are vital for development at the National, State and local levels in Nigeria.
- Eliminate duplication in the acquisition and maintenance of Geospatial data.
- Establish institutional, legal, technical and administrative frameworks for
 - (a) a consistent and harmonized mechanism for geospatial data distribution
 - (b) easy access to vital geospatial datasets and their efficient sharing and exchange
 - (c) integration of datasets through the application of common standards
- Promote investments in the production of geospatial databases.
- Promote research, training, education and capacity building related to geospatial data production, management and usage.

Policy Statement

The policy statements to guide the operations of NGDI cover the following items:

- Production, ownership/custodianship, archiving and maintenance of fundamental and thematic geospatial datasets.
- Standardisation of data production, transfer and exchange, and of hardware and software.
- Provision, standardization and maintenance of metadata for every geospatial data holding in the NGDI
- Legal issues pertaining to ownership/custodianship of datasets, copyright/intellectual property, and confidentiality, privacy and liability.
- Modalities for data access and data security.
- Modalities for the organizational arrangement of NGDI, which takes cognizance of the fact that management of geospatial datasets should be done as close as possible to source and it is non-threatening to the mandate of stakeholders. With NASRDA as the NGDI lead agency, other GI producers shall be NGDI node agencies and a 27-member NGDI Committee shall be established under the lead agency for the operations of the NGDI.
- Funding of the NGDI with a provision for a NGDI fund, which shall accrue from: minimum of 2.5% of annual budget; 10% of national ecological fund; 0.5% of profit-after-tax of private organizations; all income generated from access charge and data sales; and international funding and grants.
- Commercial aspects with provision and guidelines for access and data fees, on differential basis, for research/educational, government to government, and commercial/private use of community, private and value-added datasets.
- Capacity building in terms of manpower and technology transfer making it mandatory: to include training component in GI projects; to locally implement GI projects to a minimum level of 75%; that all GI producers shall provide evidence of the local contents of their production activities in compliance with Government policy on local content; etc.
- Promotion of synergy, and amicable resolution of possible conflicts, among GI-related national policies and legislation while ensuring that geo-referenced data produced according to NGDI-endorsed standard shall be made a compulsory

component of Environmental Impact Assessment (EIA) and Environmental Sensitivity Index mapping (ESI) for all development projects for which EIA is mandatory in Nigeria. Appropriate action shall also be taken to incorporate into national legislation, the international obligations which Nigeria has assumed under conventions and treaties for the purpose of NGDI implementation including continued participation in the progressive development of international procedures on cooperation in Regional and Global Spatial Data Infrastructures.

General Objectives

- To facilitate coordinated production and utilisation of geospatial data which are common to multiple GIS applications thereby eliminating duplication of efforts and wastage of resources.
- To facilitate rapid socio-economic growth of the nation through widely available, accessible, current, reliable and authoritative GI for planning and decision-making.
- To encourage data providers to use NGDI-endorsed standards in order to create and maintain data at a high level of quality and consistency, which can improve value of the data in decision-making.
- To provide a legal framework for the production, management, distribution and use of geospatial datasets.
- To promote relationships among organizations to support the continuing development of the NGDI.
- To develop common solution that will enable discovery, evaluation, access and exploitation of geospatial data.
- To promote the awareness of GI and its applications
- To ensure adequate funding to maintain the momentum of change towards the NGDI vision and sustain the spirit of cooperation and collaboration.
- To ensure effective technology transfer in GIT in the country.

Strategies

- Carry out User Requirements Survey and Analysis (Data Needs Assessment) including an inventory of the existing geospatial datasets and resources, and their standards.
- Make provision for immediate production of non-existent but essential fundamental datasets by the agency legally mandated to produce the dataset, in accordance with the NGDI standards.
- The custodian shall keep the dataset(s) it produced while making the metadata available to the NGDI clearinghouse.
- Efforts should be intensified on the operationalisation of Nigerian Satellites to provide stable primary data source for the production and updating of the relevant fundamental datasets.
- Develop geospatial data standards for the NGDI, which shall strive to conform to the ISO standards.

- Facilitate the creation of preliminary standard services to help users understand and apply standards, at the initial stage of NGDI development and promote the benefits of using the NGDI supported standards.
- Define the metadata content and structure for the NGDI and produce detailed metadata implementation guidelines, including practical advice on maintenance and use of metadata
- Establish Clearinghouses by creating Geospatial Data Catalogues in the NGDI node agencies and enter the certified metadata of data producers.
- Facilitate adoption and legalisation of all agreements and protocols relating to NGDI operations.
- Put in place high-speed and high-bandwidth backbone carrier in the apex clearinghouse as the main gateway and master server and implement a database server at each NGDI node agency.
- Set up a 27-member NGDI Committee to work on the implementation of the NGDI in collaboration with NASRDA as lead agency and set up NGDI focal unit in each node agency.
- Promote submission and early passage of the bill to establish NGDI, which shall include the policy items and funding.
- Encourage indigenous personnel with relevant skills in acquisition and analysis of GI in the country by ensuring that all GI related projects are locally implemented to a minimum of 75%.
- Put in place modalities to ensure that GI producers give evidence of local contents of their production activities.
- Promote synergy among GI-related policies.
- Liaise with Federal Ministry of Environment and the Department of Petroleum Resources to implement compulsory geo-referenced data requirements for EIA and ESI.
- Ensure adequate fiscal provisions and funding of the NGDI.

Policy Implementation

(a) Institutional Framework

1. Government shall establish a national committee on NGDI (called NGDI Committee) whose activities shall be coordinated by NASRDA as the lead agency (see Figures 1 and 2).
2. The stake-holders that would collectively ensure the successful realization of the NGDI vision shall include but are not limited to: Government at all levels; Private Sector Agencies; Non Governmental Organizations (NGOs); Academic and Research Community; Service Providers / Vendors and End users; Public Sector Agencies; Defense Security / Agencies.
3. The coordinating (lead) agency, NASRDA, shall work in close collaboration with Mapping Organizations at all levels and shall have powers to enforce rules and standards.
4. The NGDI committee, hosted by NASRDA, shall be composed of not more than 27 persons approved by the Honourable Minister of Science and Technology as follows:

- Two (2) persons fully employed by the coordinating agency whose rank shall not be less than a Deputy Director or its equivalent.
- Two (2) persons from the relevant academic departments of Universities, with the Universities selected in rotation.
- Two (2) persons from the relevant academic departments of polytechnics and monotechnics, with the institutions selected in rotation.
- One (1) person from each of the six geopolitical zones chosen from any of the states' nodal agencies and whose rank shall not be less than that of a Deputy Director or its equivalent. The states shall be selected in rotation.
- Four (4) persons chosen from GI related private sector, inter-governmental and non-governmental organizations.
- One (1) person each from the following Federal Ministries/Agencies whose rank shall not be less than a Deputy Director or equivalent:
 - (i) Ministry of Defense
 - (ii) Federal Surveys Department
 - (iii) Ministry of Agriculture and Rural Development
 - (iv) Ministry of Solid Minerals
 - (v) National Planning Commission
 - (vi) Federal Capital Development Authority
 - (vii) Nigerian National Petroleum Corporation
 - (viii) Ministry of Environment
 - (ix) Ministry of Water Resources
 - (x) Ministry of Transport
 - (xi) National Population Commission

5. The functions of the Committee shall be as follows:

- Develop the phases of implementation of the NGDI project
- Sensitize and mobilize all stakeholders to participate.
- Appraise the manpower potentials of the nation in all sectors for a successful realization of the NGDI.
- Collate the inventory of geo-data sets from various producers and agencies.
- Develop and streamline standards and policies for the infrastructure.
- Mobilize local funding as well as foreign assistance whether technical or financial.
- Sustain at all times, the tempo or momentum of change that will remain a necessary tonic for the realization of the NGDI project.
- Create sub committees within it for specific tasks as necessary.
- Co-opt any persons (s) it considers relevant in its functions.

b. Legal Framework

Legislation shall be enacted to support the NGDI policy to ensure the realization of the NGDI vision.

PART A

CHAPTER ONE: INTRODUCTION

1.1 Background

Geospatial Information is very essential to economic planning and national development. It is common knowledge that Geospatial Information is very vital to the development of various sectors of the economy such as Petroleum, Solid Minerals, Forestry, Agriculture, Transport, and Aviation, Environment, Security and Defense, Tourism, Census, Health, and Water Resources. In many developed countries over 80 percent of planning and decision making processes are based on Geoinformation, which is now applied to obtain solutions to a wide variety of economic, social and environmental problems. Geoinformation is regarded as a critical national resource.

In Nigeria, Geoinformation is acquired and stored in analogue form by various agencies of government such as Ministries of Works and Housing, Environment, Agriculture, Water Resources and Defence, as well as National Population Commission, National Boundary Commission and the private sector, thus limiting its use and applications. Other attendant problems include unnecessary overlaps and duplication, lack of accessibility, varying standards and formats. There is no coordinated storage system for geospatial data, which are commonly used by many agencies. Neither is there any policy for data access, sharing and exchange, and data quality.

However, the use of Geographic Information System (GIS) has revolutionized the process of data acquisition, storage, processing, dissemination and use of GI in digital format for planning and decision-making. The increasing awareness of the use of Geographic Information (GI) for decision-making over the past years has crystallized into a project titled, “Integrated Resource Management System (IRMS)/ National Geographic Information System (NAGIS) for Nigeria”. The project was proposed and being implemented by the National Planning Commission and later transferred to the National Space Research and Development Agency (NASRDA), a parastatal under the Federal Ministry of Science and Technology.

Consequently, Nigeria has realized the need to establish a National Geospatial Data Infrastructure (NGDI) by adopting policies for promoting greater awareness and public access to standard and coordinated geo-spatial data production, management and dissemination by all sectoral institutions including the establishment of a Geospatial Data Clearinghouse at various levels in the country (local, state and federal) with linkages with the private sector.

Towards the achievement of these objectives, NASRDA put in place modalities to produce a National Geoinformation Policy. To this effect, a National Committee was established and inaugurated by the Hon. Minister of Science and Technology. Also, NASRDA organized a stakeholders’ workshop on National Geospatial Data Infrastructure (NGDI), in order to ensure that the NGDI implementation fully benefited

from the suggestions, inputs and participation of stakeholders.

The establishment of NGDI backed by a National Policy will certainly eliminate most of the problems experienced by Geoinformation producers and users in Nigeria today. An efficient functioning NGDI and the associated National Policy should be regarded as vital requirements for sustainable National development.

1.2 Terms of Reference and Membership of the Committee

1.2.1 Terms of Reference

The following are the terms of reference of the committee:

(1) To provide a National Geoinformation Policy in which specific mission, goals, objectives, conceptual framework, implementation strategies, institutional arrangements, legal issues and finance are clearly defined.

(2) To produce a National Geoinformation Policy which will adequately address the collective interest of the Geoinformation Community in the following areas:

- Assessment of existing and future Geoinformation needs
- Implementation of standards
- Expansion of investment in the collection of critical geospatial data.
- Documentation of Geoinformation resources and wide publication of such information
- Promotion of greater public access to Geoinformation
- Investment in human capacity for the application of Geoinformation.
- Protection of stake-holders' interest and their data

1.2.2 Membership

The following are members of the Committee:

1. Prof. O.O. Ayeni (Chairman)
Head, Department of Surveying and Geo-informatics,
University of Lagos, Akoka, Lagos &
President, Geoinformation Society of Nigeria (GSN)

2. Dr. S. Patrick.
Hon. Commissioner of Environment
State Secretariat Complex,
Yola, Adamawa State.

3. Prof. O. S. Adegoke, NNMA
Managing Director
Mosunmolu Limited.
4/6 Oil Mill Street, Lagos.

4. Dr. Olajide Kufoniyi
Executive Director
Regional Centre for Training in Aerospace Surveys (RECTAS)
Ile-Ife &
Vice President (West Africa)
African Association of Remote Sensing of the Environment (AARSE)

5. Dr. G.N. Nsofor
Associate Professor
Department of Geography
Federal University of Technology
Minna, Niger State.

6. Surv. J.D. Ajayi
Deputy Surveyor General of the Federation (GSR)
Surveys Department
Federal Ministry of Works and Housing
Mabushi, Abuja.

7. Dr. Sani Abubakar Mashi
Senior Lecturer
Department of Geography
University of Abuja
Abuja.

8. Mr. Ade Oletubo
Senior Lecturer & Head
Department of Estate Management
Lagos State Polytechnic
Surulere, Lagos.

9. Surv. Okokon Essien
Deputy Surveyor General
State Survey Directorate
Ministry of Lands and Housing
Uyo, Akwa Ibom State.

10. Prof. Babajide Alo
Dean, Postgraduate School
University of Lagos, Lagos &
National President, Nigerian Environmental Society.

11. Secretariat: NASRDA

- a. Dr J.O. Akinyede
Director, Space Applications

- b. Mallam S. O. Mohammed
Asst. Director, Space Applications
- c. Mrs. O. A. Akiode
Senior Scientific Officer

1.3 Vision Statement

To enhance optimal use of Geospatial Information as a critical resource in all phases of sustainable national development for the alleviation of poverty and improvement of quality of life of the people of Nigeria by establishing and maintaining a National Geospatial Data Infrastructure (NGDI).

1.4 Mission Statement

The mission of the NGDI comprises of the following:

- To facilitate cooperation and collaboration among stakeholders in generating Geospatial databases which are vital for development at the National, State and local levels in Nigeria.
- To eliminate duplication in the acquisition and maintenance of Geospatial data.
- To establish institutional, legal, technical and administrative frameworks for
 - (a) a consistent and harmonized mechanism for geospatial data distribution
 - (b) easy access to vital geospatial datasets and their efficient sharing and exchange
 - (c) integration of datasets through the application of common standards
- To promote investments in the production of geospatial databases.
- To promote research, training, education and capacity building related to geospatial data production, management and usage.

1.5 Glossary of Terms

Classified Data: Security data that must not be distributed to the public.

Clearinghouse: A Geospatial data clearinghouse is an Internet based electronic house for NGDI, which links together data access services for all the distributed database sites. The clearinghouse therefore provides spatial data access services where a client can discover, evaluate and download geospatial metadata through a web browser.

Community Data: Data produced through public fund.

Copyright: Exclusive right to produce, reproduce, disseminate, publish, broadcast and adapt a Work.

Custodian: A body or person designated as having a certain right and responsibility for development and/or management of spatial data. A custodian may have the right on

behalf of the community to determine the condition for use, accessibility and distribution of data.

Dataset: It is a [coherent] collection of similar or related data.

Data Exchange Format (DEF): A format for storing vector data in ASCII or binary files.

Digital Line Graph (DLG): A USGS Map format usually used to distribute maps in Vector form.

Data mining: This is a technique that enables huge amounts of data to be searched (for patterns, relationships, etc.).

Fundamental Dataset: A dataset with national coverage needed consistently by more than one government agency in order to achieve their objectives or a dataset that cannot be derived from another dataset and other agencies derive significant benefit from using it. The dataset is considered necessary for most applications as compared to thematic data. Such a dataset is expected to be collected by government agency at government's expense. Also called Base data, Core Data, Priority data.

Geographic Information System: An integrated computer information System designed for collecting, managing displaying and analyzing large volumes of spatially referenced and associated attribute data.

Geoinformatics: Study of various methods of production, analysis, management and display of Geospatial Information and their applications.

Geospatial Data Infrastructure (GDI): Also called Geospatial Information Infrastructure (GII). It is a set of basic facilities and services, which embraces the following:

- Acquisition and distribution of geospatial data sets.
- Provision of standards and regulations for the production, access, usage, costing and distribution of Geoinformation.
- Administration and Institutional arrangements, including clearinghouse, to ensure the smooth operation of GDI.

It is also referred to as an Internet based Geospatial databases in conjunction with handling facilities for interactive access and sharing of datasets with specified standards at affordable cost.

Geospatial Information: Also called Geoinformation or Geographic Information or Spatial Information. It is information that is directly or indirectly spatially referenced to a

location on the earth's surface; such information includes the attributes of objects above or beneath the earth's surface.

Graphical User Interface: A System program that provides windows and a way for the User to manipulate them with keyboard and mouse. It provides an efficient way for users to invoke commands and access portions of a database (as opposed to entering commands from a keyboard).

Intellectual Property: The right granted by the law in relation to inventions, registered design, trademark and other rights resulting from activities in industry, science, literacy, artistic works and other intellectual activity. It includes copyright.

Internet: A computer communication network, which operates with virtual databases.

Interoperability: This is the ability of a system or components of a system to provide information sharing and inter-application cooperative process control i.e., two systems X and Y can inter-operate if X can send a request for service R to Y on the mutual understanding of R by X and Y, and Y can return response S to X based on the mutual understanding of S. It is a desirable feature of NGDI that requires standardization of service interfaces and representation of Geographic Information in data transfer. This implies that users can connect and retrieve information from multiple systems without difficulty.

Intranet: A computer network for communication (Internet) within an organization.

Joint Photographic Expand Group: The original name of the committee that designed the standard image compression algorithm. JPEG is designed for compressing either full colour or grey-scale digital images of natural real-world scenes.

Lead Agency (Coordinating Agency). An agency appointed by the Federal Government to coordinate the activities of NGDI.

License: Authority given to an agency as custodian, producer and owner of data.

Metadata: Data describing data. It is a description of the features of a dataset to facilitate access to and application of the data. Metadata for Geoinformation provides information about data source, extent, quality, spatial reference, distribution etc.

National Geospatial Data Infrastructure (NGDI): Also called National Geospatial Information Infrastructure: It is a GDI established for a nation (See GDI).

NGDI node agency: Agency of government connected with NGDI Clearinghouse to facilitate the operation of NGDI.

Ownership: Implies intellectual property right over a dataset by a body or individual.

Raster data: Data represented by an array of picture elements (pixels) with spatial positions.

Synergy: Cooperative or Combined action of two or more bodies or individuals.

TAG image File Format (TIFF): A series of standard color image file formats adopted by Microsoft and others to transfer images between different Software packages.

Thematic Dataset: Data, which are application specific.

Vector data: Representation of terrain features as 0-dimensional (point), 1-dimensional (line), 2-dimensional (area) and 3-dimensional (solid/body/volumetric) objects whose positions are given in the form of coordinates of line segments, points or text positions.

1.6 Acronyms and Abbreviations

ASCII:	American Standard Code for Information Interchange
CBO:	Community-Based Organization
CODI:	Committee on Development of Information.
DEM/DTM:	Digital Elevation Model/Digital Terrain Model
DLG:	Digital Line Graph.
DXF:	Data Exchange Format.
EIA:	Environmental Impact Assessment
ESI:	Environmental Sensitivity Index
EU:	European Union.
FEPA:	Federal Environmental Protection Agency
GDI:	Geospatial Data Infrastructure
GI:	Geospatial (or Geographic) Information.
GII:	Geospatial Information Infrastructure
GIS:	Geographic Information System / Geospatial Information System.
GIT:	Geospatial Information Technology
GSDI:	Global Spatial Data Infrastructure.
GUI:	Graphic User Interface.
ICT:	Information and Communication Technology.
ISO:	International Standards Organization.
IT:	Information Technology.
JPEG:	Joint Photographic Expert Group.
NAGIS:	National Geographic Information System.
NASRDA:	National Space Research and Development Agency.
NBTE:	National Board for Technical Education
NGDI:	National Geospatial Data Infrastructure.
NGII:	National Geospatial Information Infrastructure
NGO:	Non-Governmental Organization.
NSDI:	National Spatial Data Infrastructure.
NUC:	National Universities Commission
OS:	Operating System.

SDI: Spatial Data Infrastructure.
SON: Standards Organization of Nigeria.
SURCON: Surveyors Council of Nigeria
TIFF: Tag Image File Format.
USGS: United States Geological Surveys

PART B: POLICY ISSUES ON NGDI COMPONENTS

CHAPTER 2: GEOSPATIAL DATASETS

2.1 Preamble

The backbone of geospatial data infrastructure at any level is the interconnected geospatial databases consisting of the fundamental datasets and thematic datasets. The terms *fundamental dataset* and *thematic dataset* are as defined in chapter 1.

2.2 Fundamental Datasets

2.2.1 Preamble

Some geospatial datasets may be required for multiple applications, in which case (each of) these datasets should then be collected (or their collection coordinated) by relevant agencies and be made available to the geospatial data community through the clearinghouse. The concept of the “fundamental” or “core” aims at sharing the datasets among users in order to facilitate the development of GIS. A variable number of data layers may be considered to be common-use and of national or trans-national importance as “fundamental”. Thus, the list of the fundamental datasets should be seen as dynamic where a certain dataset, which was not seen as fundamental during initial implementation may later become desirable for inclusion in the list. Conversely, a dataset that was initially included may later be dropped and be made part of the thematic datasets.

Although different data providers may provide each component of the fundamental datasets, the datasets they provide must conform to the national standard and must be integrated to develop the core data sets.

2.2.2 Policy Statements

1. The following datasets shall constitute the fundamental datasets for the NGDI:
 - (a) Geodetic control database
 - (b) Topographic database/DEM (at the scale of 1:50000 pending availability of 1:25000 national coverage)
 - (c) Digital imagery and image maps
 - (d) Administrative boundaries’ data
 - (e) Cadastral databases
 - (f) Transportation (roads, inland water ways, railways, etc.) data
 - (g) Hydrographic (rivers, lakes, etc.) data
 - (h) Land use/land cover data
 - (i) Geological database
 - (j) Demographic database
2. The list of fundamental dataset shall be revised periodically in accordance with national needs.

3. Each of the datasets shall be produced according to NGDI-endorsed standard by the agency legally mandated to produce the dataset(s).
4. Since these datasets are community data, the producing agency shall be a custodian of the dataset produced by that agency.
5. Updating of these datasets shall be done on a continuous basis but not later than five years after production.
6. All GI projects should contain in-built programme of data updating in line with policy item 5 above.
7. All developmental projects shall include clear definitions and specifications of the relevant GI requirements right from the project inception.
8. A custodian of a fundamental dataset must, not later than 30 days after updating, furnish all updates of the base dataset to the clearinghouse; the clearinghouse shall in turn inform the custodian(s) of the derivative dataset(s) within 7 days, in order to ensure synchronous maintenance of the fundamental and derivative datasets.
9. The old data (fundamental and other) and their metadata should be archived after updating unless this is prevented due to commercial, confidentiality, copyright, or previous arrangements.
10. Archived data shall be time-stamped and version-controlled and shall not be changed, amended or altered unless this is necessary to correct an error occurring during the archiving process.

2.2.3 Objectives

1. To facilitate coordinated production and utilization of geospatial data which are common to multiple GIS applications thereby eliminating duplication of efforts and wastage of resources.
2. To facilitate rapid socio-economic growth of the nation through widely available, accessible, current, reliable and authoritative GI for planning and decision-making.

2.2.4 Strategies

1. Carry out an inventory of the existing fundamental datasets.
2. Verify and assess the standards of the datasets against the NGDI-endorsed standards
3. Upgrade (including analog to digital conversion and metadata production) and update the datasets (by the recognized custodian) in adherence to the NGDI standards.
4. Where a dataset is confirmed as non-existent (after checking in the clearinghouse), provide for its immediate production by the agency legally mandated to produce the dataset, in accordance with the NGDI standards.
5. Include the metadata as part of every new (or updated) data produced.
6. The custodian shall keep the dataset(s) it produced while making the metadata available to the NGDI clearinghouse.
7. The owners of the datasets have responsibility to update their datasets when considered old in line with policy item 5.

8. Intensify efforts on the operationalisation of Nigerian Satellites to provide stable primary data source for the production and updating of the relevant fundamental datasets.
9. Encourage and utilize international cooperation to facilitate availability of relatively low cost but high quality aerospace images where these are not provided by the Nigerian Satellites and Ground Receiving Stations.

2.3 Thematic Datasets

2.3.1 Preamble

Some other geospatial datasets may be required for specific and usually single applications, and are often derived by adding value to one or more fundamental datasets. There are two categories of *thematic datasets*: (a) thematic datasets that can be produced only by legally mandated agencies e.g. oil pipeline corridor map, various kinds of utility maps and gazetteer of place names; (b) thematic datasets that can be freely produced according to specific user requirements, e.g. tourist map, soil map, meteorological datasets and agricultural map. These datasets should also be made available to the *geospatial data* community through the *clearinghouse*. Thematic dataset may be classified as community data or private data depending on the existing legislation and funding of the production. For example, while oil pipeline corridor map is a *community data* (since this can be produced only by, or with the approval of, Government), a tourist map may be community or private depending on the funding and production agency.

2.3.2 Policy Statements

1. Needed thematic datasets shall be produced according to NGDI-endorsed standards by whoever produces the dataset(s) after having confirmed from the Clearinghouse that the dataset does not exist.
2. The metadata of the datasets shall be made available in the NGDI clearinghouse.
3. For thematic datasets that are classified as community data, the producing agency shall be a custodian of the dataset produced by that agency while the producer of a private thematic dataset shall be the owner/custodian.
4. The producer of each dataset shall ensure updating of the dataset on a regular basis as appropriate.
5. A producer of thematic data who used a fundamental dataset as input shall only update the geospatial data fields produced and maintained by that particular producer.
6. A custodian of a derivative dataset must update the dataset with reasonable promptness after receiving an update of the base dataset, to avoid possible ambiguity in the geospatial data presented.
7. The custodian of a base dataset shall render all reasonable assistance to the data custodian of a derivative dataset to perform the updating contemplated in 6 above.

2.3.3 Objectives

1. To ensure an almost total inventory of all geospatial data available in the country and facilitate their integration (via networking) and sharing thereby enhancing full utilization of the datasets' potential benefits.
2. To eliminate duplication of efforts and wastage of resources in the production of *geospatial data*.

2.3.4 Strategies

1. Carry out an inventory of the existing thematic datasets as a first step.
2. Verify and assess the standards of the data against the NGDI-endorsed standards.
3. Include the metadata as part of every new (or updated) dataset produced.
4. The owner/custodian shall keep the dataset(s) it produced while making the metadata available to the NGDI clearinghouse.
5. The owners of the datasets have responsibility to update their datasets.

CHAPTER 3: STANDARDS

3.1 Preamble

Since the goal of NGDI is on information sharing, standardisation is of paramount importance to enable interoperability of data and connectivity of information systems. Standards enable applications and technology to work together. Tools, applications and data affect each other and therefore, processes for developing standards must consider the interactions. The aspects of standardization that are of importance to NGDI include data (production) standards, data presentation and transfer/exchange standards, and hardware and software standards. It has been universally acknowledged that the value of wisely chosen standards for GI users is reflected in three primary themes, namely:

- *Portability*, which implies an ability to use and move data, software, and custom applications among multiple computers and operating system environments without re-tooling or reformatting.
- *Interoperability and information access*, which impact computers and networks, and users' ability to connect and retrieve information from multiple systems.
- *Maintainability*, which addresses the use of standards to promote long-term and efficient updating, upgrading, and the effective use of computer systems and databases.

The policy issues relating to these standards are provided here and should be used in tandem with existing nationally accepted sectoral standards on GI where they exist.

Issues relating to geospatial data collection and updating include data quality, data format, classifications and coding. Some of them are technology-driven and should therefore be dynamic in nature to keep pace with advances in technology.

Since more than 80% of the total cost of any GIS application is spent on data collection, the importance of the integrity and re-usability of the data produced cannot be overemphasized. Standardisation will consequently enable accurate cross-referencing of the datasets.

3.2 Policy Statements

3.2.1 Data (Production) Standards

1. Each NGDI node agency shall be encouraged and assisted by Government through the NGDI Committee to produce data standards that are peculiar to that node (e.g. standard for cadastral map, for soil map, for topographic map, etc.); these sectoral data standards shall be validated and endorsed by the NGDI to become NGDI standards.
2. The NGDI-endorsed standards shall cover data structure, data quality, data format, classifications, feature coding and metadata content, and shall strive at conformity with their counterpart ISO standards (e.g. ISO 15046) after endorsement by the Standard Organisation of Nigeria (SON).

3. The following data quality parameters shall be defined for each geospatial dataset (fundamental and thematic datasets): lineage, logical consistency, completeness, positional accuracy, temporal accuracy and attribute/semantic accuracy.
4. NGDI node agencies and other data producers shall adhere to the NGDI-endorsed standards.
5. NGDI Committee shall carry out standard quality audits of all geospatial data holdings of NGDI on regular basis to ascertain continued conformity with NGDI-endorsed standards and issue quality certification to the node agency before the dataset becomes part of the NGDI.

3.2.2 Data Transfer/Exchange

1. The NGDI Committee through the lead agency shall prescribe a set of common standard file formats (e.g. DXF, DLG, TIFF and JPEG) as the National Standard Exchange Format to facilitate easy transfer/exchange of data.

3.2.3 Hardware and Software

1. NGDI Committee shall ensure that all NGDI node agencies adopt the same network protocols as well as a universally stable and portable operating system (OS) that allows more flexible networking and running of many application programs (e.g. Windows NT). This will facilitate interoperability and ensure that application software do not become obsolete due to a fold-up of the OS platform.
2. The graphic user interface (GUI) shall be standardized across the NGDI network with flexibility of being upgraded in pace with the OS.
3. The storage media (for back up) shall be stable and the backup data must include a header file that gives information on the data contained therein.
4. The NGDI Committee shall ensure compatibility of hardware in accordance with the state-of-the-art.

3.3 Objectives

1. To encourage data providers to use NGDI-endorsed standards in order to create and maintain data at a high level of quality and consistency, which can improve value of the data in decision-making.
2. To ensure that datasets are fit for intended applications by providing users with assurance that the data is consistent and of defined quality.
3. To enable easier comparison and integration of GI through the use of standards.
4. To facilitate the sharing of information within the GI-community

3.4 Strategies

1. Carry out an inventory of the existing geospatial standards (data quality parameters, classification, coding system, colour codes, etc.) being used by different agencies in the country, including operational hardware, software and network. The inventory shall be part of the User requirement survey and analysis.
2. Take existing ISO standards, including those of other national SDIs (to serve as working documents) and review them to develop a framework of the country's NGDI supported standards.
3. Develop software for the translation of existing data standards (that do not conform with the NGDI standards) to the national standards.
4. Circulate the draft national standards among the GI-community for review and comments.
5. Submit the final draft of the standards to the Standard Organisation of Nigeria (SON) for further review, approval and registration with ISO.
6. Develop guidelines providing practical advice on the application of standards.
7. Facilitate the creation of preliminary standard services to help users understand and apply standards, at the initial stage of NGDI development.
8. Promote the benefits of using the NGDI supported standards.

CHAPTER 4: METADATA

4.1 Preamble

Despite being in the information age, there are still problems getting the appropriate information to help in making the right decisions. Poor decisions are frequently made because we do not know who holds the information we require and how to get hold of it. These information concerning geospatial data including such other details as the geographical extent of the data, quality of the data, when it was last updated and who its supplier is, are described in a metadata structure and they enhance the use of GI in making appropriate decisions.

Metadata helps people who use geospatial data to find the data they need and determine how best to use the data. It also benefits the data producing agencies as well, because as personnel changes in an organization, undocumented data may lose their value due to little understanding of the contents and uses by the new staff. Moreover, lack of knowledge about other organisation's dataset can lead to duplication of effort. The value of a dataset is therefore dependent on its documentation.

4.2 Policy Statements

1. Every geospatial data producer shall provide metadata for each of its data holdings.
2. The metadata content shall include the following information at the minimum:
 - Data quality (positional accuracy, attribute accuracy, temporal accuracy, lineage, completeness and logical consistency)
 - Geospatial data organization and spatial reference (coordinate system, datum, map projection)
 - Identification information (name of data, custodian/owner, geographic coverage)
 - Entity/attribute information (formats, type, measurement units)
 - Distribution information (distributor, format, access protocol, procedure).
3. The metadata of any dataset shall be updated whenever the dataset is updated.
4. The metadata produced shall conform to the national standard.
5. The metadata structure shall strive to conform to the ISO metadata standard (ISO TC211).
6. Metadata shall accompany the dissemination of all geospatial data.
7. A conformance certificate shall be issued to every data producer that provides metadata for its data holdings in accordance to the national standard.
8. Government, through the lead agency and in consultation with the NGDI Committee, shall establish electronic geospatial metadata catalogue and Clearinghouses in NGDI node agencies in partnership with those agencies.
9. The certified metadata of data producers shall be entered into the National Data Catalogue in all NGDI Clearinghouses.

10. Any data producer that fails to provide the metadata for its dataset after the expiration of a period of transition, to be determined by the NGDI Committee, shall be guilty of an offence.

4.3 Objectives

1. To provide documentation of existing geospatial data resources available within an organization
2. To permit structured search and comparison of existing geospatial data by various users thereby providing users with expanded choice of data.
3. To determine the dataset's fitness for a particular use
4. To provide information on means of accessing the dataset and facilitate interoperability of datasets.
5. To provide information needed during transfer so that the dataset can be processed for use in an appropriate context.

4.4 Strategies

1. Define the metadata content and structure for the NGDI by adapting the ISO metadata content to Nigerian situation.
2. Formalise the draft content and structure through a review process involving the country's GI community, to define the metadata content standard for the country.
3. Register the metadata standard with the SON and the ISO.
4. Identify, catalogue and evaluate sources and producers of existing geospatial data.
5. Produce detailed metadata implementation guidelines, including practical advice on maintenance and use of metadata
6. Encourage and assist producers of existing data to provide the metadata of their datasets using the guidelines in 5.
7. Develop conformance and testing clauses for metadata.
8. Evaluate the metadata contents produced in 6 and issue adherence certificate to those that meet the standard while advising others on the appropriate steps to take to upgrade their datasets to meet the standard.
9. Establish Clearinghouses by creating Geospatial Data Catalogues in the NGDI node agencies and enter the certified metadata of data producers.
10. Promote the metadata service to the existing and potential GI community.
11. Update the metadata and data catalogue on regular basis as required and retain a sustained target of data providers with encouragement and advice on how they can make their metadata available to the clearinghouse.

CHAPTER 5: LEGAL ISSUES

5.1 Preamble

The legal policy items herein defined are largely based on the subsisting situation in the country wherein Government agencies are the only legally recognised producers of fundamental datasets. Thus custodianship becomes a crucial component of NGDI to legally identify an authoritative source of the above-mentioned datasets, which are produced with public funds. This provides accountability for fundamental datasets. In the future, and in line with the privatization drive of Government, production of fundamental datasets may be privatized (funded, produced and owned by private institutions). Should this happen, it shall become imperative to redefine the legal policy items accordingly.

The NGDI Committee, through the lead agency, should regularly provide advice to government on legal issues regarding the production, management and dissemination of geospatial data to ensure that GI are produced, maintained and delivered in a nationally consistent way. See chapter 14 for further aspects of the legal framework.

5.2 Policy Statements

5.2.1 Ownership/Custodianship

1. The owner of a geospatial dataset shall be the person or institution who funded and created the dataset
2. The custodian shall be the person or organization who is responsible for the production, storage, management and distribution of the dataset on behalf of another organization (usually Government).
3. The producer of public-funded data (community data) shall only be custodian and not owner, managing the data as a trustee for the community and the authoritative source of the fundamental dataset in its care.
4. The owner (or custodian in the case of community data) of a dataset shall be responsible for:
 - Quality control and assurance
 - Data content and formats
 - Validation and maintenance
 - Storage and security
 - Maintenance and updates of metadata
 - Accessibility of the data through supply of the metadata to the Clearinghouse.

5.2.2 Copyright/Intellectual Property

1. A data owner shall own the copyright of the data produced by him/her.
2. For value-added data, the producer shall own the copyright of only the value-added component of the data.

3. For integrated, non-decomposable composite datasets, the producer of the data shall own the copyright provided that permission has been obtained from the copyright holder(s) of the individual base data.
- 4 A data owner, custodian and user shall, prior to the utilization of any geospatial dataset to which the user has gained access, enter into a licensing agreement with regard to the use of the dataset.
5. The licensing agreement shall provide for the following:
 - The duration of the agreement
 - The legal protection of the copyright of the owner and any other interested party
 - A maximum number of permitted users within the organization where an organization is the beneficiary of the agreement
 - Any other provisions that the parties may deem necessary.
6. A user who has accepted geospatial dataset from a custodian shall not supply the data to a third party unless this is covered by a licensing agreement specifying release criteria.

5.2.3 Confidentiality, Privacy and Liability

1. Data providers shall disclose or make available, their dataset on request unless it is prevented by law.
2. Only geospatial data related to national security projects shall be granted confidentiality upon the permission of the President-in-Council.
3. However, confidential data may be shared at the discretion of the owner or custodian.
4. Geospatial data shall be collected only by an organization that is legally recognized to do so.
5. A geospatial data owner (or custodian in the case of community data) shall be accountable for the integrity of unmodified data, which is supplied by the owner/custodian.
6. A custodian shall be deemed to possess indemnity against any liability arising from unauthorized use of its dataset.
7. A user shall report any problem or shortcoming, which in his/her opinion affects the quality of a geospatial data, within 30 days after discovering the problem or shortcoming, to the clearinghouse.
8. The user reporting any problem as in 7 above shall provide sufficient information to enable the provider to identify the record(s) that contain error(s) or the problems that make the data unusable, and where possible, provide what should be the correct record(s).
9. The clearinghouse shall convey the information to the relevant data custodian while denying access to the affected data until the producer has rectified the identified problem.

5.3 Objectives

1. To provide a legal framework for the production, management, distribution and use of geospatial datasets.
2. To provide a means of accountability and reliability of source for designated GI within Government
3. To ensure accessibility of the information and provide a recognized contact point for the distribution, transfer or sharing of the information.

5.4 Strategies

1. Prepare formal agreement guidelines that agencies wishing to use an existing geospatial data (e.g. to develop a value-added service or information product) must sign with the producer of the base data. The agreement should describe: the terms and conditions under which the use of the data is permitted, including those related to privacy, confidentiality, protection of Government's interest and national security; requirement to protect copyright; term or period of the agreement; definition and scope of liability for the use and accuracy of the data, and any subsequent modification of the data; responsibilities of all parties for the ongoing maintenance of the data; format, presentation, performance criteria and quality of data supplied; and, monetary or other compensatory considerations where applicable.
2. Prepare a draft of the appropriate penalties for any offence committed within the framework of the NGDI operations.
3. Carry out a review of the agreement guidelines and penalties within the GI community.
4. Facilitate adoption and legalisation of all agreements and protocols relating to NGDI operations, including authority by NGDI to mandate contributing agencies to commit their geospatial datasets to the NGDI.

CHAPTER 6: DATA ACCESS AND DATA SECURITY

6.1 Preamble

One of the objectives of the NGDI is to share data and thus avoid duplication of efforts. Sharing of the data is made possible through coordinated and structured access to a wide variety of information (metadata) about geospatial data owned by public and private sector organisations. Transparent access to various geospatial data can provide relevant information for countless applications leading to value-added services and market opportunities in a deregulated economy. Access to data is made possible through the implementation of metadata catalogue and establishment of clearinghouse within a legal framework, all of which have been addressed in earlier chapters. However, data access protocols need to be developed in order to define a set of consistent and workable arrangements that can be used by the GI community to streamline access to data and derived information products while recognizing the rights of all parties (owners, custodians and users).

6.2 Policy Statements

1. There shall be two categories of data access, namely:
 - Restricted access, and
 - Community Access
2. Only geospatial data related to national security projects shall be granted restricted access in accordance with policy item 2 of section 5.2.3; such data shall be available to users by agreement of data owner(s) on a case-by-case basis under conditions stated in a licence agreement
3. There shall be free access under a legal framework (protection of copyright) to other community and private datasets.
4. Data may be reclassified from one access category to another as circumstances change over time, subject to the approval of the data owner/custodian and agreement by stakeholders.
5. All archived data shall be made available to agreed parties as described in the access protocol.
6. An access registration system, which should be simple to understand and designed to minimize compliance costs, shall be put in place in the form of a search/order form that requires the user to specify queries for data with certain properties while providing such information as name and organization of user, address, intended use of data, etc.
7. The mode of access shall be defined in the access protocol and it may include on-line access (view-only, direct to user's database e.g. via ftp, brokered – providing specification of data access request to secondary access service, etc.) or off-line access (hardcopy delivery or Softcopy delivery on storage media such as CD-ROM).
8. The apex clearinghouse shall be established at the main NGDI focal agency.

9. Each geospatial data-producing agency shall establish a metadata database server as a NGDI node, linked to the apex clearinghouse.
10. Reasonable security measures shall be put in place to minimize damage to, unauthorized access, modification and loss of current and archived data. These include access authentication devices, software devices (such as password, marking of files as read-only when downloading has not been authorized, etc.), hardware devices, computer fire-wall protection, general fire protection, physical security (e.g. burglar-proof buildings, security personnel, etc.), etc.

6.3 Objectives

1. To promote relationships among organizations to support the continuing development of the NGDI.
2. To develop common solution that will enable discovery, evaluation, access and exploitation of geospatial data.
3. To promote the awareness of GI and its applications

6.4 Strategies

1. Develop and implement the access rules and protocol including pricing rules and a flexible, easy-to-use search request form.
2. Develop and implement a standard request authentication system for use in the clearinghouse of all NGDI node agencies.
3. Put in place high-speed and high-bandwidth backbone carrier in the apex clearinghouse as the main gateway and master server.
4. Implement a database server at each NGDI node using the access protocol and linked to the master server.
5. Design and implement appropriate network linkage mechanism among the NGDI node agencies.

CHAPTER 7: ORGANISATIONAL ASPECTS

7.1 Preamble

The main sources of GI for Nigeria belong to government agencies. Each of the agencies has a legal mandate and business plan with subject-specific strategy of production, quality control and dissemination of its datasets. The ability to make these disparate datasets more widely available, to collaborate with each other and to interact with the private sector and other GI users requires appropriate organizational arrangement. In this context, it is important to clearly understand who the stakeholders are and what roles each will play. The organizational arrangement should be such that management of the data should be done as close as possible to source and it is non-threatening to the mandate of stakeholders (commercial and government stakeholders need to feel comfortable as active participants in the infrastructure). The arrangement should also ensure sustainability of the infrastructure. Consequently, another chapter (12) has been devoted to this important aspect of NGDI to deal more comprehensively with the policy outline given here.

7.2 Policy Statements

1. The apex clearinghouse shall be at NASRDA as coordinating agency with clearinghouse nodes at other geospatial data producing agencies.
2. A NGDI Committee shall be established under the auspices of the coordinating agency (see Figure 1 for Organisational Framework).
3. Membership (comprising representatives of major stakeholders) and functions of the Committee shall be as defined in Chapter 12.
4. Government shall ensure that the NGDI Committee has the authority to mandate contributing agencies to commit their geospatial data holdings to the NGDI under the framework of “keeping management of data close to source of production”.
5. Each contributing agency shall be NGDI node (e.g. National Mapping Agency as node for topographic database, administrative boundaries and geodetic framework; NASRDA as node for space image data; Geological Surveys as node for geological database; etc.) and shall establish a NGDI focal unit in the agency.
6. Each NGDI agency shall maintain its own node as part of an intranet and link to the master NGDI server (see Figure 2).

7.3 Objectives

1. To facilitate the implementation of a GDI that would:
 - be inclusive of all stakeholders;
 - add value to GI;
 - build on, facilitate and support existing initiatives;
 - command respect and authority;
 - support sustainable development;
 - be flexible and adaptable to change;

- facilitate new initiatives especially those relating to the use and sharing of data;
- be as simple, transparent, open and democratic as possible;
- enhance decision making processes and engender partnerships.

7.4 Strategies

1. Set up the NGDI Committee with membership and functions as defined in chapter 12.
2. Carry out inventory of NGDI node agencies and formalize their participation in NGDI (e.g. through the User Requirement Survey and Analysis and follow-up activities to stakeholders meeting).
3. Set up NGDI focal unit in each node agency.
4. Prepare and sponsor a bill to establish the National Geospatial Data Infrastructure.
5. Establish the NGDI Internet domain name and website.
6. Set up intranet facilities to link the NGDI nodes.

CHAPTER 8: FUNDING

8.1 Preamble

Government finds it increasingly difficult to adequately fund GI production projects in the face of constantly increasing pressures on the federal budget, consequently GI production programs have often been slow and so out of date after production that their value is seriously compromised. Yet majority of all developmental projects and planning require GI for a meaningful implementation. There is therefore a compelling need for adequate policy on funding of the NGDI and for the Government to respect it as Government will have to take the lead and provide the enabling mechanism for NGDI to generate its own funds.

8.2 Policy Statements

1. Government (at all levels) shall ensure that GI activities are adequately funded by creating a NGDI Fund, which shall accrue from the following sources:
 - minimum of 2.5% of the annual budget in line with UN resolution on GI production and management;
 - 10% of the National Ecological Fund for the production and management of GI which shall be used for solving ecological problems;
 - 0.5% of profit-after-tax of private sector organizations;
 - all income generated from access fees and data sales;
 - international funding and grants.
2. Each NGDI node agency shall be supported with an annual budget for its support operations to NGDI.
3. Where and if a fundamental dataset does not exist or requires extensive updating, special allocation shall be made for their production.
4. A separate account shall be operated for the NGDI Fund.
5. NGDI lead agency and the NGDI Committee shall actively promote funding of all NGDI node agencies and work out further mechanism of obtaining fund for NGDI.

8.3 Objectives

1. To enable sustainable production, management and utilization of up-to-date and reliable GI in support of the country's socio-economic developmental needs.
2. To promote, in the public interest, easier and more economical access to GI.
3. To ensure adequate funding to maintain the momentum of change towards the NGDI vision and sustain the spirit of cooperation and collaboration.

8.4 Strategies

1. Promote acceptance of improved funding by Government through awareness campaign.

2. Promote submission and early passage of the bill to establish NGDI, which shall include the policy items, including funding.
3. Ensure a sustained tempo of publicity on the activities related to NGDI to keep Government attention focused on the ideals and desirability of the NGDI project to guarantee steady flow of funds and interest.

CHAPTER 9: COMMERCIAL ASPECTS

9.1 Preamble

It is envisaged that at an appropriate time after operationalisation of the NGDI, access to NGDI could be driven commercially by demand. It is therefore appropriate to build cost recovery mechanisms into the NGDI.

9.2 Policy Statements

1. Reasonable fee shall be charged for providing access to data i.e., data search fee (on-line or off-line), apart from payment for the data itself.
2. For community data, the guidelines for charges shall be as follows:
 - For Research/Educational Use: Subsidized rate of not more than 50% of cost of production.
 - For Government to Government: the rate should cover only cost of production and dissemination
 - For commercial/private use, rate should not be less than the cost of production and dissemination
3. For data generated and owned by private organisations, pricing shall be competitive.
4. For value-added data, the rate shall not be less than the total of cost of value-addition plus the cost of the input datasets with the latter remitted to the original owner/custodian.

9.3 Objectives

1. To facilitate sustainable development of the NGDI.
2. To promote development of GI on a cost recovery basis.

9.4 Strategies

1. The NGDI Committee, in consultation with stakeholders, will develop the detail pricing mechanism.
2. The pricing schedule will be ratified and distributed to all stakeholders and posted on the NGDI website.

CHAPTER 10: CAPACITY BUILDING

10.1 Preamble

Capacity building in terms of manpower and technology is essential for a sustainable development of the NGDI. Consequently adequate attention needs to be paid to this aspect of the infrastructure.

10.2 Policy Statements

- 1 Every GI project shall include a training component for various grades of manpower (operators, supervisors, managers, etc.) in relevant aspects of GIS.
- 2 The NGDI coordinating agency and other GI producers shall carry out public awareness programmes from time to time on applications of GI.
- 3 All institutions of learning offering Geoinformatics-related programmes shall review their Geoinformatics/GIS curricula on regular basis in line with advances in GIT.
- 4 All GI projects shall be locally implemented to a minimum level of 75% to strengthen local capacity and technology transfer.
- 5 All GI producers shall provide evidence of the local contents of their production activities in compliance with Government policy on local content.
- 6 Impact assessment of GI projects on the society shall be regularly carried out by the NGDI stakeholders.
- 7 Government, through the coordinating agency, shall encourage research on new innovations in Geoinformatics and its various applications in the management of land, water, environment and natural resources.
- 8 There shall be a programme of mandatory continuing educational/professional development for GI practitioners.
- 9 Introductory Geoinformatics shall be added to the curriculum of secondary school to enable faster permeation of GI applications in the society.
- 10 Nigerians in the diaspora with relevant skills shall be encouraged to actively participate in the NGDI.

10.3 Objectives

1. To promote sustainable development of the NGDI.
2. To ensure effective technology transfer in GIT in the country.

10.4 Strategies

1. Encourage institutions of higher learning in the country, through NBTE and NUC, to modernize their various geoinformatics-related curricula.
2. Encourage professional bodies dealing with GI to implement mandatory continuing professional development programme.
3. Mount awareness programmes on regular basis in collaboration with Institutions of learning.

4. Carry out inventory of GI case studies undertaken by research and educational institutions.
5. Select sample “best practices” from the compiled case studies and use them to promote awareness programmes.
6. Encourage publications of GIS applications and case studies in national and international journals.
7. Promote establishment of a national association (e.g. the Geoinformation Society of Nigeria) as an umbrella body for all GI-related Associations and as a mouthpiece for NGDI and its activities.
8. Promote a yearly conference of the association to further strengthen awareness of NGDI activities as well as the impact of GI on national socio-economic development
9. Encourage indigenous personnel with relevant skills in acquisition and analysis of GI in the country by ensuring that all GI related projects are locally implemented to a minimum of 75%.
10. Put in place modalities to ensure that GI producers give evidence of local contents of their production activities.

CHAPTER 11: RELATED NATIONAL POLICIES AND LEGISLATION, INTERNATIONAL TREATIES, PROTOCOLS AND COOPERATION

11.1 NATIONAL POLICIES AND LEGISLATION

11.1.1 Preamble

In realization of the multi-disciplinary nature of GIS and GI activities, it is essential to streamline the policies of NGDI with the existing national policies of related organs/agencies.

11.1.2 Policy Statements

1. NGDI shall promote synergy among GI-related policies and legislation, such as National Mapping Policy, National Information Technology Policy, National Space Policy, National Policy on the Environment, SURCON Decree No. 44 of 1989 (now SURCON Act Cap 425 of 1990), FEPA Decree No. 58 of 1988, EIA Decree No. 86 of 1992, National Agenda 21, Vision 2010, etc.
2. Where conflict of policy arises, the NGDI Committee shall ensure amicable resolution of the conflicting policy in national interest.
3. Geo-referenced data produced according to NGDI-endorsed standard shall be made a compulsory component of Environmental Impact Assessment (EIA) and Environmental Sensitivity Index (ESI) mapping for all developmental projects for which EIA is mandatory in Nigeria.

11.1.3 Objectives

1. To ensure synergy of operations among GI-related agencies and thus promote sustainable national development.
2. To eliminate any possible source of conflict that may endanger sustainability of the NGDI.

11.1.4 Strategies

1. Identify all GI-related policy documents
2. Extract policy items that are relevant to NGDI from these documents and bring them to the awareness of the NGDI community.
3. Where conflict arises, the NGDI Committee shall resolve the conflicting issues with the relevant agency.
4. Promote awareness of the NGDI policy items among the related agencies.
5. Promote synergy of the related policies.
6. Liaise with Federal Ministry of Environment and the Department of Petroleum Resources to implement compulsory geo-referenced data requirements for EIA and ESI.

11.2 INTERNATIONAL TREATIES, PROTOCOLS AND COOPERATION

11.2.1 Preamble

International Agreements assume a variety of form and style but the law of treaties governs them all, which is part of customary international law. By the 1969 Vienna convention, Treaties are “agreements concluded between states in written form and governed by international law, whether embodied in a single instrument or in two or more related instruments and whatever its particular designation”. Protocols, declarations, charters, covenants, pacts and general acts are single instruments that lack the formality of a treaty. Cooperation is a loose agreement that may not be binding. Whatever the coloration of these agreements, they spell cooperation in the end and we should strive to honour them as a Nation particularly when we are signatories to them.

11.2.2 Policy Statements

1. Appropriate action shall be taken to incorporate into national legislation, the international obligations which Nigeria has assumed under conventions and treaties for the purpose of NGDI implementation.
2. Nigeria shall continue to participate in the progressive development of international procedures on cooperation in Regional and Global Spatial Data Infrastructures and take advantage of best-proved practices.
3. Nigeria shall ensure prompt payment of financial contributions and meet its other obligations to relevant international organizations.

11.2.3 Objectives

1. To keep abreast with international standards and procedures in the development of the NGDI.
2. To tap from the experiences of other nations, avoid pitfalls, and steer away from “re-inventing the wheel” which can be very expensive.
3. To minimize waste and trial and error during realization.

11.2.4 Strategies

1. Keep abreast with regional and global GDI events via the Internet.
2. Where circumstances demand, visit countries that are apparently ahead in NGDI activities, such as USA, EU countries, India and South Africa, for on the spot appraisals and experience.

PART C: POLICY IMPLEMENTATION

CHAPTER 12: ADMINISTRATIVE / ORGANISATIONAL FRAMEWORK

12.1. Preamble

In deriving a policy direction towards a successful realization of the NGDI, static tendencies and undue adherence to 'strict' structures or frameworks must give way to reality; that is, there must be a willingness for inter-professional, inter-governmental and inter-agency cooperation facilitated by a coordinating body approved by Government. The coordinating body should however not imperil decentralization, but would be an over-arching organizational structure.

12.2 Policy Statements

1. Government shall establish an administrative/organizational framework that shall be a multidisciplinary, inter-agency and inter-sectoral network of institutions whose activities and decisions shall focus on the production, management, sale and use of geospatial information. The network of institutions shall also engage in research and training of persons seeking to be involved in GI activities.
2. This network of institutions shall be coordinated by the lead agency, which shall be vested with powers to administer the NGDI through an organizational framework as shown in Figure 1.
3. The stake-holders that would collectively ensure the successful realization of the NGDI vision shall include but are not limited to:
 - i) Government at all levels
 - ii) Private Sector Agencies
 - iii) Non-Governmental Organizations (NGOs) and Community-Based Organizations (CBOs)
 - iv) Academic and Research Community
 - v) Service Providers / Vendors and End users
 - vi) Public Sector Agencies
 - vii) Defense Security / Agencies
4. The coordinating (lead) agency, NASRDA, shall work in close collaboration with the relevant National, State and Local Government Legislative Committees and Geospatial data producing/Mapping organizations at all levels and shall have powers to enforce rules and standards.
5. The NGDI committee, hosted by NASRDA, shall be composed of not more than 27 persons approved by the Honourable Minister of Science and Technology as follows:

- Two (2) persons fully employed by the coordinating agency whose rank shall not be less than a Deputy Director or its equivalent.
- Two (2) persons from the relevant academic departments of Universities, with the Universities selected in rotation.
- Two (2) persons from the relevant academic departments of polytechnics and monotechnics, with the institutions selected in rotation.
- One (1) person from each of the six geopolitical zones chosen from any of the states' nodal agencies and whose rank shall not be less than that of a Deputy Director or its equivalent. The states shall be selected in rotation.
- Four (4) persons chosen from GI related private sector, inter-governmental and non-governmental organizations.
- One (1) person each from the following Federal Ministries/Agencies whose rank shall not be less than a Deputy Director or equivalent:
 - (j) Ministry of Defense
 - (ii) Federal Surveys Department
 - (iii) Ministry of Agriculture and Rural Development
 - (iv) Ministry of Solid Minerals
 - (v) National Planning Commission
 - (vi) Federal Capital Development Authority
 - (vii) Nigerian National Petroleum Corporation
 - (viii) Ministry of Environment
 - (ix) Ministry of Water Resources
 - (x) Ministry of Transport
 - (xi) National Population Commission

6. The functions of the Committee shall be as follows:

- Develop the phases of implementation of the NGDI project
- Sensitize and mobilize all stakeholders to participate.
- Appraise the manpower potentials of the nation in all sectors for a successful realization of the NGDI.
- Collate the inventory of geo-data sets from various producers and agencies.
- Develop and streamline standards and policies for the infrastructure.
- Mobilize local funding as well as foreign assistance whether technical or financial.
- Sustain at all times, the tempo or momentum of change that will remain a necessary tonic for the realization of the NGDI project.
- Create sub committees within it for specific tasks as necessary.
- Co-opt any person(s) it considers relevant to its functions.

12.3 Objectives

The objectives of this organizational structure are:

- 1 To ensure and encourage interplay between GIS and Culture (attitudes, tendencies, dispositions) at all organizational and societal levels to enable

- technology innovation diffusion and guarantee ‘good practice’ in the adoption and use of GI technology.
- 2 To ensure the inclusion of all stakeholders and protect their interests.
 - 3 To encourage transparent partnership and minimize bureaucracy.

12.4 Strategies

1. Identify, examine and rectify (where necessary) areas of co-operation and/or possible conflicts in the existing institutional frameworks.
2. Ensure adequate fiscal provisions and funding of the NGDI as indicated in chapter 8.
3. Encourage case study or pilot system approach of implementation for effective monitoring and evaluation.
4. Ensure cost recovery as a major component of the evaluation model.
5. Build and maintain a technical framework akin to Figure 2 that will facilitate the realization of the functions of the NGDI Committee.

CHAPTER 13: LEGAL FRAMEWORK

13.1 Preamble

As large databases are developed and processes of data sharing and exchange become complicated, societal control over them must be regulated through sound legal framework. Fair treatment is necessary for all concerned but existing laws and the underlying power balances, which these laws support, may conflict. The effects of legislation on some domains of the society are key considerations in formulating laws. People would be the main drivers of the NGDI, supported by technology and legal norms establish how people should collaborate. Legislation or law is therefore the software of society and must be given due attention in the successful realization of the NGDI vision.

13.2 Policy Statements

1. Legislation shall be enacted to support the NGDI policy to ensure the realization of the NGDI Vision.
2. Areas of conflict or overlap with existing laws shall be resolved without loss of focus from the NGDI vision.
3. Government shall position as a matter of urgency, a pragmatic mapping policy with full legal backing to compliment the NGDI effort.

13.3 Objectives

The objective of the above is to ensure that legal bottlenecks to realization are removed and potentials for litigation are minimized or eliminated in the course of operating the components of the NGDI.

13.4 Strategies

1. Prepare laws related with the NGDI in parallel with the evolving infrastructure.
2. Ensure early passage of the NGDI law at the National Assembly.

