# A REVIEW OF NATIONAL SPATIAL DATA INFRASTRUCTURE IMPLEMENTATION (NSDI) IN NIGERIA

**Adamu Muhammad Bello**

National Space Research and Development Agency, Abuja, Nigeria

## INTRODUCTION

Nigeria is a developing country located at west Africa with a point coordinate of 9.0820N, 8.6753E.

In developing countries like Nigeria where information is a scarce resource; particularly, accurate, timely and quality information. In addition, the political will and resources to fully make use of this information may be lacking. The major causes of underdevelopment and economic woes of many third world countries like Nigeria could stem from number of factors such as corruption, political instability, legacy of colonialism, geopolitical situation that exploits resources at low value, trade barriers, poor quality data collection, organization and management practices including lack of adequate infrastructure and skilled human capacity to develop its economy in a sustainable manner. The consequences of these are: food insecurity, air and water pollution, poor sanitation, social insecurity and environmental degradation among others (Kufuniyi and Akinyede, 2005).

For these reasons, the development and implementation of NSDI has proven to be very important in Nigeria and a way forward in decision making across all spheres of her economy.

In Nigeria, NSDI is also called the NGDI (National Geospatial Data Infrastructure).

## COMPONENTS AND FRAMEWORK OF NGDI INTEROPERABILITY

Important as NSDI is in National development, it require infrastructures for data generation and distribution in any country. Webster Dictionary defines infrastructure as the under lying foundation or basic framework of a system or organization. In this case, it is the framework for National spatial data.

### *The Framework Data*

This consists of the fundamental or core data and non-fundamental datasets (Armenakis, 2008). The fundamental data are georeferenced base data layers such as geodetic controls, road networks, hydrographic data, topographic data, cadastral information, administrative boundaries, etc. upon which other non-fundamental thematic data layers like vegetation cover, geological map, population map etc. are aligned.

The components of a spatial data infrastructure include sources of the geospatial data, the data, databases, metadata, data networks and technology. The sources of spatial data are aerial photographs, topographic maps and the satellite imageries.

*Standards*

There is always a need to apply international standards to spatial data to simplify access and improve data quality and integration. Standards are required in reference systems, data model, data dictionaries, data quality, data transfer and metadata. There are different standards for different datasets. Standards are essential for interoperability of data and information.

*Policies and Institutional Arrangements*

The institutional framework defines the policy and administrative arrangements for building, maintaining, accessing, and applying the standards and datasets (ANZLIC 1998). Policies and Institutional Arrangements define other components of NGDI such as governance, data privacy and security, data sharing, and cost recovery (Federal Geographic Data Committee, 2008)

*People and Partnerships*

The formation of cross jurisdictional partnerships is the foundation of NGDI initiatives supported to date. People are the key to transaction processing and decision making. All decisions require data and as data becomes more volatile human issues of data sharing, security, accuracy and access forge the need for more defined relationships between people and data.

*Outreach and Awareness*

It is necessary to undertake a variety of projects to publicize the spatial data infrastructure nationwide using such media as the Internet, brochures, trade show exhibitions, workshops and conferences. This is very important in sensitizing the populace. Most people including the members of the National Assembly who will eventually debate and pass the necessary legislation do not at the moment seem to appreciate the importance of the NGDI. So, creation of awareness is a very important component of the implementation strategy.

*Capacity Building*

The development of NSDI requires the use of highly skilled labor. Having people who have good understanding, knowledge of the technology and managerial ability has been identified as the most critical success factor for the development of any technology (Adeniyi, 1995). The people include management personnel, system analysts, system designers, programmers, data input personnel, geo-information vendors, system users (operators or data analysts) and end users of processed geographical data.

*Access Network*

The availability of clearinghouse catalogue is paramount in any NSDI. The apex Clearinghouse shall be at the National Space Research and Development Agency (NASRDA) as coordinating agency with Clearinghouse nodes at other geospatial data producing agencies.

The National GI Policy has a comprehensive statement on metadata of which the main ideas can be summarized as the following, “Every geospatial data producer shall provide metadata for each of its data holdings; the metadata of any dataset shall be updated whenever the dataset

is updated; the metadata produced shall conform to the national standard; the metadata structure shall strive to conform to the ISO metadata standard (ISO TC211).

## KEY CAPABILITIES OF NGDI IN NIGERIA, ENABLING THE IMPLEMENTATION OF THE CONCEPT OF PARTNERSHIP AND COLLABORATIONS

One of the mission of the NGDI is the generation and dissemination of geospatial databases. Partnership and collaborations among Geo-information stakeholders are facilitated for the generation and dissemination of these databases which are necessary for development in Nigeria.

Three establishment has been provided by the National Geo-Information Policy including;

- ✓ The NGDI Council
- ✓ The NGDI Committee
- ✓ The NGDI Sub-Committee

*The NGDI Council*

The function of the NGDI Council is to develop all policy guidelines on NGDI with the Vice President of the Federal Republic of Nigeria as the Chairman and the Federal Ministry of Science and Technology as its Secretariat.

*The NGDI Committee*

The Honorable Minister of Science and Technology inaugurated a 27-member committee encompassing personnel from the academia, public sectors, Geo-Information related NGOs and private sectors. The National Space Research and Development Agency (NASRDA), is the lead Agency.

The Committee members are well spread in terms of stakeholders and geographical distribution across the country in order to enforce partnership and create an enabling environment for data access and dissemination.

*The NGDI Sub-Committee*

In line with the recommendations of the Stakeholders/Users meeting of February 2003, six sub-committees were created at the inaugural meeting of the NGDI Committee. They include;

- ✓ Geospatial Datasets Sub-Committee
- ✓ Standards Sub-Committee
- ✓ Clearinghouse and Metadata Sub-Committee
- ✓ Capacity Building and Awareness Sub-Committee
- ✓ Legal Sub-Committee
- ✓ Sustainability and Funding Sub-Committee.

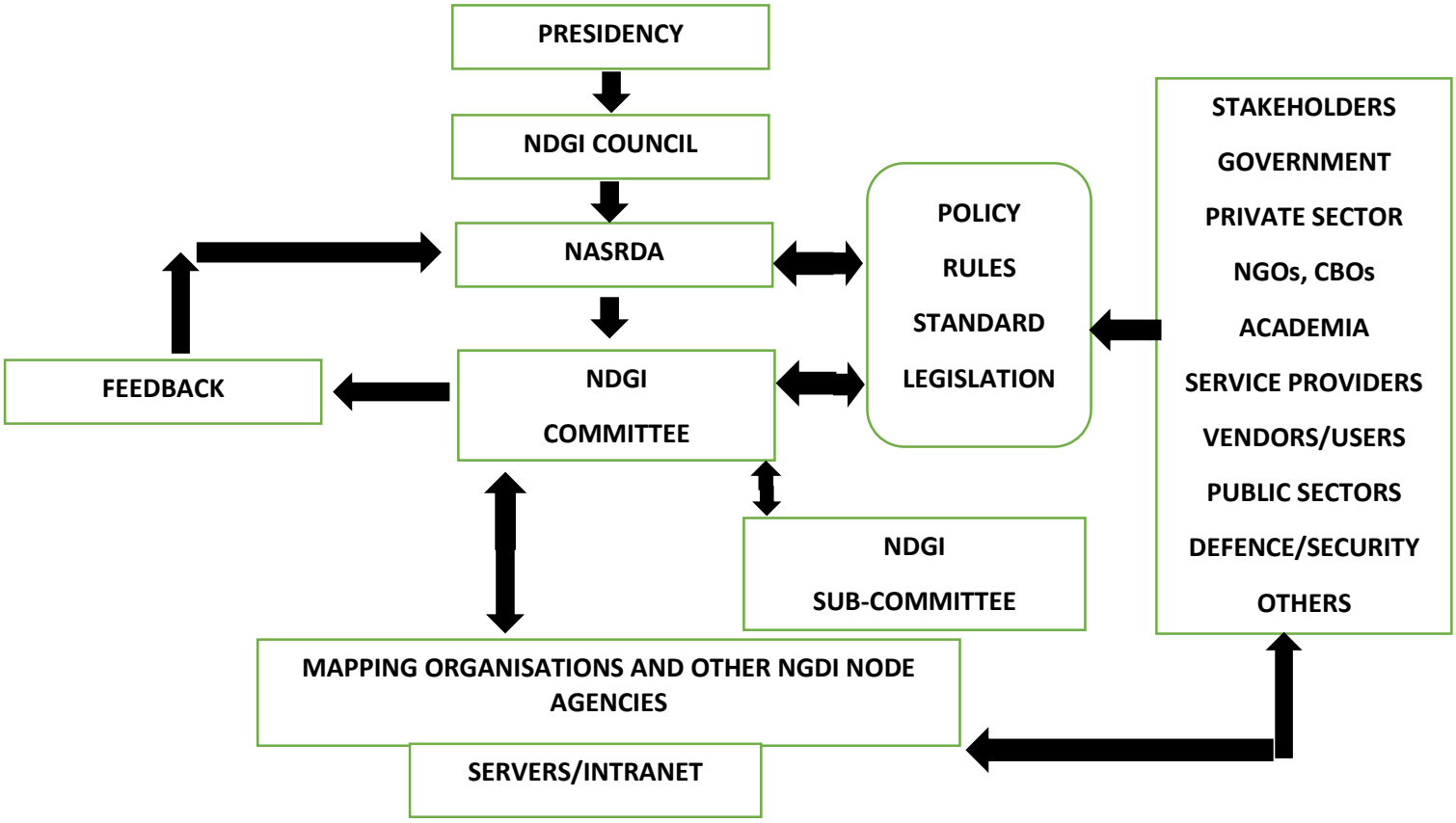


Figure 1: Organizational Framework of Nigeria NGDI (National Geo-Information Policy, September, 2003)

## CHALLENGES AND FACTORS INHIBITING THE ESTABLISHMENT OF NGDI IN NIGERIA

The assessment of NGDI initiatives in Nigeria and most African countries reveals inadequate political goodwill as occasion by low awareness levels among the principal ministries and relevant institution on the significant of NGDI, confusion surrounding the definition and/or composition of NGDIs, weak policy and coordination arrangements, inadequate capacity (human and physical resources) as well as complexity of national issues such as the political, cultural and economic positions of most countries (Longley et al, 2009).

The following are highlights of factors inhibiting the establishment of NGDI in Nigeria;

- ✓ Lack of political will from Government
- ✓ Lack of co-operation from sister organizations
- ✓ Lack of zeal and interest on the part of operators and participants
- ✓ Inadequate equipment
- ✓ Low level of awareness
- ✓ Inadequate funding and continuous support
- ✓ Power (Electricity) problems

- ✓ The problem of Telecommunications

However, it is most appropriate to propose possible solution when talking about problems therefore, the following are also highlights of possible solution to these impediments of establishing NGDI in Nigeria;

- ✓ Awareness through Education and publicity in the media.
- ✓ Government recognition and support
- ✓ There should be adequate funding
- ✓ Improve supply of Electricity
- ✓ Provision of adequate equipment and other facilities needed for NSDI
- ✓ Calling a meeting of stakeholders among others

## CONCLUSION

Nigeria have fairly committed resources for NGDI development and grouped among the average performers in the NSDI development in Africa and thus provide lessons on which other regional counterparts can draw from (Longley et al, 2009). Nigeria has successfully launched an indigenous medium and high resolution earth observation satellites (NigeriaSat-1, NigeriaSat-2 and NigeriaSat-X) and has re-launched communication satellite NigComsat-1R.

Nigeria has played prominent role in the regional NGDI development corroborated by her involvement in the African Resource Management Satellite (ARMS) Project which is a cornerstone of the African Satellite Constellation. Nigeria has undertaken this jointly with South Africa and Algeria who are reputable in terms of NSDI development.

The development of NDGI in Nigeria still depends on the government and stakeholder goodwill. This necessitates awareness creation at national and regional levels on the significance of spatial data on sustainable development. This corroborates the need for spatial data producers to transform themselves to suit the requirement of the industry.

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