Lagos State Geoinformation Infrastructure Policy (LAGIS) As a Tool for Mega City Development: Opportunities and Challenges

ANTHONY A. ADEOYE, Nigeria

Key words: Mega City, LAGIS

SUMMARY

The Big Cities Policy is currently the major urban policy in the Lagos State of Nigeria since 2007. The policy is now in full swing to support the Lagos State Geoinformation Infrastructure Policy (LAGIS). Consequently, Lagos State Government embarked on a comprehensive digital surveying and mapping of the whole state, which has resulted in the creation of an Enterprise GIS Database and the establishment of Lagos State Geoinformation Infrastructure Policy (LAGIS).

The Lagos State Geoinformation Infrastructure Policy (LAGIS) is to support development programmes such as tourism promotion, industrial development, boundary resolution (inter and intra state), property valuation and revaluation for effective taxation and revenue collection, population and housing census operation, planning of urban and rural settlements and transportation, flood and erosion control, mineral development, including bitumen and petroleum and agricultural, and communication planning.

This paper will describe the approach adopted towards the development of the Lagos State Geoinformation Infrastructure Policy (LAGIS) and examine in details the opportunities and challenges being faced. Finally the paper will assess the potential impact of these changes in the current and immediate future.

TS 1B - SIM in Support of Mega City Management   1/1
Anthony Adeoye
Lagos State Geoinformation Infrastructure Policy (Lagis) As A Tool For Mega City Development: Opportunities
And Challenges

FIG Congress 2010
Facing the Challenges – Building the Capacity
Sydney, Australia, 11-16 April 2010

Lagos State Geoinformation Infrastructure Policy (LAGIS) As a Tool for Mega City Development: Opportunities and Challenges

ANTHONY A. ADEOYE, Nigeria

1.0 INTRODUCTION

Lagos Mega City is the sixth largest city in the world, projected to become the third biggest urban conurbation on the planet by the year 2015. With a population density second only to Bombay in India, Lagos faces enormous challenges of Infrastructure due to its population. Lagos is an established transport hub, with our International Airport and Seaports accounting for large percentages of the travel and trade of the Federal Republic of Nigeria.

1.1 Lagos State Mega City Dynamics

Megacity is defined as a metropolitan area with a total population in excess of ten million people. Megacities allow convinience and good opportunities to find work, but they are fraught with complicated problems. It is somewhat difficult to get an accurate count of city dwellers, as population censuses are somewhat inacurrate in thier estimation. Additionally, some dispute arises among experts as to what outlying city areas, such as suburbs, are meant to be included in the population count.

Regardless of these difficulties, it is widely believed that at least 26 cities meet the criteria of 10 million inhabitants, with many additional cities on the cusp of joining. These cities include Tokyo, New York, and Los Angeles. Tokyo has more than 35 million residents, is currently the largest megacity.

Recently, Lagos city joined the megacity with the population of about 18 million people. In Lagos most of the Nigerian's Corporations choose to have their Headquarters in Lagos City. The location of Lagos State is highly favourable capitalizing on the vast resources of Nigeria and West Africa.

Consequently, Lagos State embarked on various development programmes such as tourism promotion, industrial development, boundary resolution (inter and intra state), property valuation and revaluation for effective taxation and revenue collection, population and housing census operation, planning of urban and rural settlements and transportation, flood and erosion control, mineral development, including bitumen and petroleum and agricultural, and communication planning to support the megacity status.

1.1.1 Beautification of Lagos

Lagos State Government embarked on various beautification and landscaping projects across the state. The projects include the loops, medians along highways, setbacks and development of recreational parks in some identified locations within the metropolis.

<u>1.1.2   Lagos Safe City Project</u>

Currently, about 18 million people of Lagos State are being protected and policed by 33,000 police men and women. Lagos, the financial hub of Nigeria has one of the highest crime rates in the world, lacks a reliable emergency response services and efficient crime control system. Therefore, as part of the Lagos Mega City Project, the Lagos Safe City Project was introduced to install 10,000 solar-powered closed circuit cameras all over the metropolis, under the Lagos Safe City Project.

The Lagos Safe City Project is to adopt best practices, cameras, sensors, tracking devices are the nerve center of these facilities that would assist men and officers of the police force, fire service among others to do their duty much more effectively via a Central Security Command Unit, where the cameras will be managed remotely (wireless connection), and used to coordinate security, emergency responses, and traffic needs of the state.

2.0   LAGOS STATE MEGA CITY PROJECT – THE MISSING LINK

The need to acquire up-to-date base maps for the various Mega City Projects was identified as a missing link for the mega city development programmes. Therefore the State Government decided to carry out a comprehensive digital mapping of the whole state, which will result in the creation of a GIS Database which will also serve as a veritable tool for orderly development control mechanism for the state.

2.1   Digital Mapping Infrastructure Development and Status of the Project.

The increasing awareness for the use of Geoinformation for decision making has culminated in the establishment of the "Lagos State Digital Mapping and GIS Project" by the Executive Governor of Lagos State, His Excelllency Mr. Babatunde Fashola (SAN). The project, the first of its kind in Nigeria, which is over 80% complete is expected to produce the following deliverables:

(i)   First/second order Controls, their signalisation and densification
(ii)   Aerial photos at 1:4000 for the whole state
(iii)   Digital maps at 1/500 for Lagos Metropolis and 1/1000 for rural areas, orthophoto for the whole state at 1/2000 and DTM.
(iv)   GIS Database creation,GIS Applications and GIS Enterprise
(v)   Geoid and an active GPS reference Station
(vi)   Hardware, Software, ICT Infrasructure and Staff training development
(vii)   Bathymetric Chart of the Major Waterways.

TS 1B - SIM in Support of Mega City Management   3/3
Anthony Adeoye
Lagos State Geoinformation Infrastructure Policy (Lagis) As A Tool For Mega City Development: Opportunities And Challenges

FIG Congress 2010
Facing the Challenges – Building the Capacity
Sydney, Australia, 11-16 April 2010

- Lidar Technology and other state of the art digital mapping infrastructure were used. The flying has been successfully completed with the production of orthophotos.

- Hardware, Software and Perpherials to work with GIS Software, Data Processing to surpport data management, analysis, visualization and dissemination.

- Several terabytes of Statewide data, including streets, transportation layers, raster imagery, topographic maps, place-names, administrative boundries, and elevation data have been collected.

- The loading of data has commenced in a centralized form at the Ministry of Science and Technology which connect Ministries, Departments and Agencies with more than 2500 PCs in Large Area Network with Internet Connectivity.

- The ArcGIS Enterprise Edition has also been successfully installed.

- The installation of the On-Point Application software has also been completed. The on-point software is the e-commerce application of the project.

3.0 APPROACH ADOPTED FOR THE ESTABLISHMENT OF THE LAGIS POLICY

As a result to this project the Digital Mapping and GIS, the State Government saw the need to establish a state-wide Geoinformation policy as well as a state Geospatial Data Infrastructure for promoting applications of Geoinformation for development programmes and to create greater public awareness for a standard and coordinated Geospatial data production, management and dissemination by all sectorial institutions at Local and State levels.

3.1 The Purpose of the Policy

To produce a State Geoinformation Policy which will address the collective interest of the Geoinformation Community in the state and achieve the following objectives without being in conflict with the National Geoinformation Policy:

i.   Establish a vision, mission, goals and standards for Geoinformation in the State
ii. Provide strategies for achieving (i) above and for promoting awareness for Geospatial Data Production and access, applications of Geoinformation for development, Data integrity and security, Human Capacity Building, commercial and Legal Aspect of Geospatial Data in the State
iii. Provide guidelines for the establishment and arrangement of Lagos State Geospatial Data Infrastructure (LSGDI) and its components such as Lagos State Geographical Information Systems (LAGIS), Lagos State Enterprise GIS and Lagos State spatial Solutions Infrastructure (LASSI)

TS 1B - SIM in Support of Mega City Management   4/4
Anthony Adeoye
Lagos State Geoinformation Infrastructure Policy (Lagis) As A Tool For Mega City Development: Opportunities
And Challenges

FIG Congress 2010
Facing the Challenges – Building the Capacity
Sydney, Australia, 11-16 April 2010

3.2   Vision Statement

To promote optimal use of Geospatial Information for sustainable development and for the alleviation of Poverty and improvement of the quality of life of the people of Lagos State by establishing and maintaining Lagos State Geospatial Data Infrastructure (LAGDI)

3.3   Mission Statement

The mission of Lagos State Geospatial Data Infrastructure consists of the following:
- To establish a Geospatial Infrastructure that harmonizes the mechanism for data acquisition and distribution in the State
- To create a Lagos State Enterprise GIS (LAGIS) that connects Government citizens and businesses in providing Geospatial Data and Web-based GIS services on 24/7 basis.
- To promote research, training and education and capacity building in Geogeo data production management and usage
- To establish Institutional, legal, technical commercial and administrative frameworks for the operation of LAGIS that will empower Lagos State Government to make informed decisions and to provide enhanced services to its Stakeholders and Constituents.

3.4   Goals and Strategies of the Policy

Goal 1:   Achieve State Focus for Geo Information Initiatives

Strategies
1.1   Align State Geoinformation Data Infrastructure initiatives to economic, social and environmental priorities of all levels of government, industry and general community
1.2   Increase high-level political awareness and support
1.3   Establish effective communication with users of geo information

Goal 2:   Create Strategic Organisational Framework

Strategies
2.1   Build effective organisational structures for communication and development of LAGIS initiatives
2.2   Establish effective relationships with key stakeholders
2.3   Build and maintain international relationships as a basis for placing LAGIS initiatives into a broder context and maintaining a strategic oversight on initiatives in other states

Goal 3:   Promote Geoinformation Data Infrastructure for State

Strategies

3.1   Promote a clear understanding of the LAGIS and develop   a practical implementation plan that is actively supported by key stakeholders

3.2   Clearly identify the direct linkages between the LAGIS and the issues and objectives that are priorities for government and key stakeholders

Goal 4:   Encourage the Use of Geo Information to Support Better Decision Making

Strategies

4.1   Provide a framework for development of policies and standards, which facilitates access to geo information

4.2   Encourage the development of skills needed to manage and use geo information

4.3   Develop a better understanding of the role of geo information in improving decision making

3.5   Policy Issues

The LAGIS places emphasis on harmonising standards for geo data capture and exchange, the co-odination of data collection and maintenance activities and the use of common databases by different agencies, thereby promoting the use of geo information in decision making and removing impediments to the use of geo information in any part of the state. The primary objectives of LAGIS is to ensure that users of land and geographic data, who require a state coverage, will be able to acquire complete and consistent datasets that will meet the state requirements, even though the data is collected and maintained by different jurisdictions.

The policy issues examined in the LAGIS includes and not limited to the following:
- Geospatial Datasets
- Standards
- Metadata
- Legal Issues
- Data Access and Data Security
- Organisational Aspects
- Funding
- Commerce Aspects
- Capacity Building
- Related National Policies and Legislation
- International Treaties, Protocols and coperation

3.6   Work Plan

Formation of LAGIS Committee

<u>Zero Draft Policy – March 2009</u>

TS 1B - SIM in Support of Mega City Management   6/6
Anthony Adeoye
Lagos State Geoinformation Infrastructure Policy (Lagis) As A Tool For Mega City Development: Opportunities
And Challenges

FIG Congress 2010
Facing the Challenges – Building the Capacity
Sydney, Australia, 11-16 April 2010

In March 2009 the committee produced a Zero Draft.

Refined Draft Policy – April 2009
The Committee produced a refined policy document which was submitted to the State Government for perusal.

Draft Policy(Revision. l) – April 2009
The refined Draft Policy was sent to Geoinformation Stakeholders in the Private and Public Sector in the State and National level for thier comments and suggestions.

Draft Policy(Rev. 2) – May 2009
Based on the comments and suggestions of the stakeholders a revised draft policy was produced.

Final Draft Policy
Draft Policy Rev. 2 is to be deliberated upon and considered by the State Executive Council to produce the Final State Geoinformation Draft Policy.

Lagos State Laws Governing Geoinformation Technology
The final Geoinformation Policy will be sent to the Ministry of Justice to prepare a Bill which will be passed by the State House of Assembly and signed into law by His Excellency Mr. Babatunde Fashola, The Executive Governor of Lagos State.

3.7   Approach For Policy Implementation

3.7.1   Establishment of Geoinfrmation Data Infrastructure

In deriving a LAGIS policy direction, the Lagos Geoinfrmation Data Infrastructure needed to support the collection, maintenance and utilisation of geographic information in a particular state. This encompasses human resources,technology,standards, policies, institutional arrangements and funding as well as geospatial data management. The LAGDI was identified as the Infrastructure needed towards a successful realization of the LAGIS.

3.7.2   Components of Geoinformation Data Infrastructure

The geoinformation data infrastructure model comprises of four core compnents namely: Institutional Framework, Technical Standards, Fundamental Datasets and Clearing House Network.

  –   Institutional Framework

The Institutional Framework defines the policy and administrative arrangements for building, accessing and applying the standards datasets.

TS 1B - SIM in Support of Mega City Management   7/7
Anthony Adeoye
Lagos State Geoinformation Infrastructure Policy (Lagis) As A Tool For Mega City Development: Opportunities And Challenges

FIG Congress 2010
Facing the Challenges – Building the Capacity
Sydney, Australia, 11-16 April 2010

– Technical Standards

The Technical Standards defines the Technical characteristics of the fundamental datasets. This is because the geoinformation data infrastructure requires standadrdsin each of the following areas: reference systems, data models, data dictionaries,data quality,data transfer, and metadata.

– Fundamental Datasets

Fundamental Datasets are produced within the institutional framework which must be compiled with the defined technical standards. The fundamental standards arevthe datasets which are collected as primary data sources, and from which other information is derived by integration or value-added.

– Clearing House Network

Clearing House Network is the means by which the fundamental datasets are made accessible to the community, in accordance with policy determined within the institutional framework, and to the technical standards agreed. The Clearing house network is the final component of geoinformation data infrastructure.

4.0   OPPORTUNITIES AND CHALLENGES

The critical success factors for the Lagos State Geoinformation Infrastructure Policy (LAGIS) is the involvement and establishment of relationships with key stakeholders, including:

- Relevant ministries through a Minsterial Forum
- Providers of geo information services
- Data custodians
- Geo information users
- Local governments
- National sponsors of fundamental datasets
- Professional bodies, education and research institutions

There is great expectation among our people that Lagos State stands at the threshold of new era of peace, progress, prosperity and security largely through the radical modernization of our infrstructure.

4.1   Capacity Building

The capacity building concept is often used within a narrow meaning such as focusing on staff development through formal education and training programmes to meet the lack of qualified personnel in a project in the short term. The capacity building in the project looked at management and transfer of knowledge and skills in using geo information. To this end over

five hundred staff of Lagos State Government from various ministries, departments and agencies have been trained both locally and internationally. The capacity building has enhanced tremendously the ability and capacity of the users of the system to serve society needs.

4.2   Costing of Sales of Digital Maps and Mapping Information

The costing for map and mapping information is the major challange being faced under the the project. The challanges includes determination of the sale price of digital map and digital information. This challange also includes the determination of the cost and benefit analysis in terms of return on investment.

4.3   Data Access

Geospatial data users are able to find and access existing data sources and services with minimum impediments. However, mechanisms need to be provided for data sources and service providers to advise potential users about the availability of their geospatial data and services.

4.4   Data Quality

Users are able to easily ascertain the quality of existing geo data and its fitness to meet their needs. The availability of metadata is the key to providing users with documentation about data quality. For the LAGIS policy preparation, international best practices are been considered for adoption in geospatial data management, including adoption and use of data quality documentation standards.

4.5   Technology Challenges

Access to and combination of geo data sources and services were in the policy, through use of world's best practice interoperable technologies. The availability of online Web Services models, Internet standards and geo interoperability standards are the major challenges being faced. However, Lagos State Government supports the implementation and use of the open systems specifications and the World Wide Web Consortium (WWWC) in Spatial Data Infrastructure (SDI), as part of the e-Government Interoperability Framework.

4.6   Institutional Development

Establishing appropriate institutional and organisational infrastructures is seen as a crucial key for achieving sustainability in LAGIS policy.The fundamental institutional challange in the LAGIS policy is related to understanding the development of appropriate institutional,legal and technical processes to integrate land administration and topographic mapping programs within the context of a wider LAGIS policy.

TS 1B - SIM in Support of Mega City Management   9/9
Anthony Adeoye
Lagos State Geoinformation Infrastructure Policy (Lagis) As A Tool For Mega City Development: Opportunities
And Challenges

FIG Congress 2010
Facing the Challenges – Building the Capacity
Sydney, Australia, 11-16 April 2010

4.7 Sustainability challenges

The State Government has invested huge sum of money in the developmental programmes and projects for the megacity including the establishment of enterprise GIS the first of its kind in Nigeria. The challenge is to provide the megacity 'managers', both political and professional, with appropriate 'actionable intelligence' to support more proactive decision making that encourages more effective sustainable development of LAGIS policy and LAGDI implementation.

4.8 Increase Revenue Generation

In Nigeria, the model for GIS Revenue Generation is the Abuja Geographical Information System (AGIS) with projected revenues from derivable fees from GIS services for the 2007 fiscal year was =N=1.5 Billion approximately $10 million but as at June 2007, the projected income had been surpassed. The challenge for Lagos State enterprise GIS is to be another model for GIS returns on investment.

5.0 FACING THE CHALLANGES

5.1 Transforming the Face of Lagos

5.2 Creating an Enterprise Decision Surpport Systems

6.0 RECOMMENDATIONS

Lagos Sate is been used as a case study of how Geo Data Infrastructure can be used to support urban land planning; real estate management and development; environmental management; public safety; and social and economic infrastructure. Lagos State government should identify key problems they face both now and in the future; use an international network of experienced geo information practitioners to identify potential solutions; and then develop materials that provide a practical guide to international best practice in the use of SDI to better manage our cities.

7.0 CONCLUSION

Lagos has no doubt become a model for change in Nigeria. The city is transforming, attracting to itself much domestic and international goodwill. Lagos State offers the willing investor one of the highest rates of return on investment in the world. Boundless opportunities for profitable investment exist in Tolled Road Construction, Water Transportation, Light Rail, Mass Transit Schemes, Housing Estates, Waste Management and Compaction, Water Supply and Distribution, Electricity Generation and Distribution, Hospitality, Recreation and Entertainment among several other exciting possibilities. As Lagos is growing in this way,effort should be made to stem the tide of growth in this direction so that our megacity will actually live up to its being a Centre of Excellence for generations yet unborn.

TS 1B - SIM in Support of Mega City Management   10/10
Anthony Adeoye
Lagos State Geoinformation Infrastructure Policy (Lagis) As A Tool For Mega City Development: Opportunities And Challenges

FIG Congress 2010
Facing the Challenges – Building the Capacity
Sydney, Australia, 11-16 April 2010

REFERENCES

Anthony A. Adeoye, (2001): Geographic Information Systems Operations and Management, Lagos.

AAC Consulting, (2007) Request for proposal digital mapping and GIS Lagos State.

Eyinla, B.M (2001) From Lagos to Abuja, the Domestic Politics and International Implications of Relocating Nigeria's Capital City.' Bochum.

Fasinro, H.A.B.(2004) Political and Cultural Perspectives of Lagos , Academy Press Lagos.

Lagos State Organization Review (2008) Lagos Megacity Phenomenon

Otokiti, S.O.(2004): Resource Creation, Control and Consciousness in Lagos State: The Cultural Dimension, CEFOLAS, Lagos College of Education, Lagos.

The Lagos Indicator (2008) the Lagos Economic Summit Eko Atlantic City

The Applications of Geospatial Information Technology in Land Management: A Case Study of Lagos, Nigeria, Albert Osei et al, GSDI-9 Conference Proceedings, 6-10 November 2006, Santiago, Chile)

Federation International Government (FIG) 2002: The Nairobi Statement on Spatial Information for sustainable Development.

BIBLIOGRAPHICAL NOTES

Anthony Adeoye is the Managing Director of AAC Consulting, the firm is one of the fastest growing GIS company in Nigeria. He studied at the University of East London and University of Westminster, London where he obtained BSc and MSc in Surveying and Mapping Sciences and Information Systems Design respectively. He is a Member of the Royal Institution of Chartered Surveyors, United Kingdom. He is currently the Chairman of the Royal Institution of Chartered Surveyors – Nigeria Group.

Tony inspires innovative action, foster change and influence decision-making processes in the development of GIS in Nigeria. His many acclaimed – and best selling books include Geographic/Land Information Systems – Principles and Applications and Geographic Information Systems – Operations and Management.

CONTACT
Anthony A. Adeoye
AAC Consulting
299, Ikorodu Road,
Maryland
Lagos
NIGERIA
GSM: +2348023213408

TS 1B - SIM in Support of Mega City Management   11/11
Anthony Adeoye
Lagos State Geoinformation Infrastructure Policy (Lagis) As A Tool For Mega City Development: Opportunities And Challenges

FIG Congress 2010
Facing the Challenges – Building the Capacity
Sydney, Australia, 11-16 April 2010