USES, APPLICATIONS AND PROSPECTS OF GIS IN NIGERIA

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Too simple – electronic map.

Exactly – system of computer, software, personnel, peripheral equipment and data.
Geographic Information System (GIS) is a computer system build to capture, store, manipulate, analyze, manage and display all kinds of spatial or geographical data.

GIS application are tools that allow end users to perform spatial query, analysis, edit spatial data and create hard copy maps.

In simple way GIS can be define as an image that is referenced to the earth or has x and y coordinate and it’s attribute values are stored in the table.
GIS can be used to solve the location based question such as “What is located here” or Where to find particular features?

GIS User can retrieve the value from the map, such as how much is the forest area on the land use map.

This is done using the query builder tool. Next important features of the GIS is the capability to combine different layers to show new information.
GIS Applications and Uses

GIS in Mapping

- Mapping is a central function of Geographic Information System, which provides a visual interpretation of data.

- GIS store data in database and then represent it visually in a mapped format.

- People from different professions use map to communicate.

- It is not necessary to be a skilled cartographer to create maps. Google map, Bing map, Yahoo map are the best example for web based GIS mapping solution.

- Cloud sourcing highly in use today
visualisation process

How do I say What to Whom, and is it effective?

Geographic Data

Map
Transportation Planning: Accident Analysis and Hot Spot Analysis

- GIS can be used in managing transportation and logistical problems.

- If transport department is planning for a new railway or a road route then this can be performed by adding environmental and topographical data into the GIS platform.

- This will easily output the best route for the transportation based on the criteria like flattest route, least damage to habitats and least disturbance from local people. GIS can also help in monitoring rail systems and road conditions.

- Intelligent GIS-based accident analysis: Real-Time. Monitoring Automated System using WiMAX/GPRS

- By identifying the accident locations, remedial measures can be planned. Rerouting design is also very convenient using GIS.
Traveling salesperson problem

- The traveling salesperson problem is the problem of a person that has to visit several sites and want to know the best (fastest) route to do this.

![Map of travel routes](image1.png)
Navigation (routing and scheduling)

- Web-based navigation maps encourage safe navigation in waterways.
- Ferry paths and shipping routes are identified for better routing.
- ArcGIS supports the safe navigation system and provides accurate topographic and hydrographic data.
- Recently, DNR began the task of locating, documenting, and cataloging historic wrecks with GIS.
- This can keep the boating public informed of these coastal hazards to minimize risk of collision and injury.
Urban Planning: Determine land use/land cover changes

- GIS technology is used to analyze the urban growth and its direction of expansion, and to find suitable sites for further urban development.
- Also it can detect and estimate the changes in the land use/land cover pattern within time.
GIS for Balancing planning & community development
Precision agriculture

- GIS can be used to create more effective and efficient farming techniques. It can also analyze soil data and to determine: what are the best crop to plant?, where they should go? how to maintain nutrition levels to best benefit crop to plant?
- Global positioning system (GPS); Geo-informational system (GIS); Remote Sensing (RS); Intelligent Devices and Implements (IDI); Computers
Telecom and Network services

- GIS can be a great planning and decision making tool for telecom industries.

- **GDi GISDATA** enables wireless telecommunication organizations to incorporate geographic data into the complex network design, planning, optimization, maintenance and activities.

- DEM can also be used to find suitable sites for the location of telecommunication infrastructure

- This technology allows telecom to enhance a variety of application like engineering application, customer relationship management and location-based services.
Disaster Management and Mitigation

- Today a well-developed GIS systems are used to protect the environment.

- It has become an integrated, well developed and successful tool in disaster management and mitigation.

- GIS can help with risk management and analysis by displaying which areas are likely to be prone to natural or man-made disasters.

- When such disasters are identified, preventive measures can be developed.
GIS Solutions in Banking Sector

- Today rapid development occurs in the banking sector.
- So it has become more market driven and market responsive.
- The success of this sector largely depends on the ability of a bank to provide customer and market driven services.
- GIS plays an important role providing planning, organizing and decision making.
Natural Resources Management

- By the help of GIS technology the agricultural, water and forest resources can be well maintain and manage.
- Foresters can easily monitor forest condition. Agricultural land includes managing crop yield, monitoring crop rotation, and more.
- Water is one of the most essential constituents of the environment.
- GIS is used to analyze geographic distribution of water resources.
- They are interrelated, i.e. forest cover reduces the storm water runoff and tree canopy stores approximately 215,000 tons carbon.
GIS for Business

- GIS is also used for managing business information based on its location.
- GIS can keep a track of where the customers are located, site business, target marketing campaigns, and optimize sales territories and model retail spending patterns.
- Such an added advantage is provided by the GIS to enhance in making companies more competitive and successful.
GIS and erosion control

- apply raster GIS methods to a soil erosion model for a drainage basin displaying varying types of topographic and land use conditions.

- Modelling physical processes with GIS
- Raster (grid) analysis; local operations and neighborhood operations
- Map algebra
- Boolean operators
Soil Mapping

- Soil mapping provides resource information about an area.
- It helps in understanding soil suitability for various land use activities.
- It is essential for preventing environmental deterioration associated with misuse of land.
- GIS Helps to identify soil types in an area and to delineate soil boundaries.
- It is used for the identification and classification of soil.
- Soil map is widely used by the farmers in developed countries to retain soil nutrients and earn maximum yield.
GIS based Digital Taxation

- In Local Governments, GIS is used to solve taxation problems.
- It is used to maximize the government income.
- For example, for engineering, building permits, city development and other municipal needs, GIS is used.
- Often the data collected and used by one agency or department can be used by another.
- Using GIS we can develop a digital taxation system.
Surveying is the measurement of location of objects on the earth’s surfaces.

Land survey is measuring the distance and angles between different points on the earth surface.

An increasing number of national and governments and regional organizations are using GNSS measurements.

GNSS is used for topographic surveys where a centimeter level accuracy is provided.

These data can be incorporated in the GIS system.

GIS tools can be used to estimate area and also, digital maps can prepared.
Tourism Information System

- GIS provides a valuable toolbox of techniques and technologies of wide applicability to the achievement of sustainable tourism development.
- This provide an ideal platform tools required to generate a better understanding, and can serve the needs of tourists.
- They will get all the information on click, measure distance, find hotels, restaurant and even navigate to their respective links.
Fire equipment response distance analysis

- GIS can be used to evaluate how far (as measured as via the street network) each portion of the street network is from a firehouse.

- This can be useful in evaluating the best location for a new firehouse or in determining how well the fire services cover particular areas for insurance ratings.

- Best location for hydrants
Traffic Density Studies

- Population increase
- GIS can effectively use for the management of traffic problems.
- By creating an extensive database that has all the traffic information such as:
  - speed data,
  - road geometry,
  - traffic flow and
  - other spatial data.

Processing this information will provide us the graphical bigger picture for the traffic management.
GIS and flood mitigation

- GIS enable us to determine the spatial flooding situation and the degree of the city’s susceptibility to flooding
- DEM or DTM can be used
Utilities

- The GIS is used for different type of utilities like electricity, telecom and cooking gas on a daily basis and utilities to help them in mapping, in:
  - inventory systems,
  - track maintenance,
  - monitor regulatory compliance or
  - model distribution analysis,
  - transformer analysis and
  - load analysis.

- Best location for hydrants, customers, parcels, pipes, etc
GIS for Public Health

- GIS provides the cost effective tool for evaluating interventions and policies potentially affecting health outcomes.

- GIS analysis, environmental health data is also helpful in explaining disease patterns of relationships with social, institutional, technological and natural environment.

- It can be understand the complex spatial temporal relationship between environmental pollution and disease, and identifying exposures to environmental hazards.
Knowledge Based System for Defense Purpose

- The uses of GIS provide information regarding the terrain features which can be useful for planning today’s war strategies.
- It is increasingly being used to derive terrain information from digital images.
- Which help to the selection of suitable sites for various military uses more accurate and faster.
Pipeline Route Selection

- Pipeline route planning and selection is usually a complex task.
- GIS technology is faster, better and more efficient in this complex task.
- Accurate pipeline route selection brings about risk and cost reduction as well as better decision making process.
- GIS least cost path analysis have been effectively used to determine suitable oil and gas pipeline routes.
- An optimal route will minimize reduce economic loss and negative socio-environmental impacts.
Site Suitability for Waste Treatment Plant

- With the help of GIS we can integrate various aspect layers in GIS and can identify which place is suitable for waste treatment plant.
- This process will reduce the time and it is cost effective. Also it enhances the accuracy.
- It provides a GIS analyst to identify a list of suitable dumping sites for further investigations.
- It also provides a digital bank for future monitoring program of the site.
GIS for Wildlife Management

- Man made destruction such as habitat loss, pollution, invasive species introduction, and climate change, are all threats to wildlife health and biodiversity.

- GIS technology is an effective tool for managing, analyzing, and visualizing wildlife data to target areas where international management practices are needed and to monitor their effectiveness.
Crime Analysis

- GIS is a necessary tool for crime mapping in law enforcement agencies worldwide.
- Crime mapping is a key component of crime analysis.
- Satellite images can display important information about criminal activities.
- The efficiency and the speed of the GIS analysis will increase the capabilities of crime fighting.
Prospects

- Future developments in GIS applications and questions of legal validity.
- Progress on conceptual and technical issues.
- Progress on data issues.
- Progress on human and organizational issues.
- GIS and public policy.
- GIS and medical geography: Spatial analysis and medical geography; Infectious disease and GIS; GIS in AIDS control and research.
- GIS in Agriculture
- GIS in Urban infrastructure planning
- GIS in transportation planning
- GIS in crime
Challenges of GIS application in Nigeria

data ..data ..data ..data ..data ..data..data

“It is not information overload. **It is filter failure**”

Clay Shirky
talk @Web2.0 Expo

The future is geospatial!
Thank you!
Sit, relax & enjoy reading the slides
Some sources

- http://grindgis.com/what-is-gis/what-is-gis-definition
- http://grindgis.com/blog/gis-applications-uses#prettyPhoto
- https://www.linkedin.com/company/gdi-gisdata