

# **Developing an interactive web map of abia state polytechnic, aba-nigeria, as a vehicle for resource inventory and sustainable development**

**Njike CHIGBU, Michael Moses APEH, Francis Richard OTIA (Nigeria)**

## **ABSTRACT**

One very effective way to make map information available to a group of nontechnical end users is to make it available through a web page. Web mapping sites are becoming increasingly popular. There are two broad kinds of web mapping application. The emergence of online consumer geoinformatics services has strengthened web search engines like Google <http://www.google.com> releasing its own dedicated geographic interfaces, which run or route in standard Web browsers and also allow institutions and the general public with detailed satellite imagery map layers that were once only available to experts and select user communities. This paper is premised on the utilization of interesting capabilities geospatial technology and the web offers. Georeferencing and digitizing was carried out in Quantum GIS software. We created web map of Abia State Polytechnic, Aba campus. This can be browsed online at [https://qgiscloud.com/abainami/Francis Otia HND Proj updtd/](https://qgiscloud.com/abainami/Francis_Otia_HND_Proj_updtd/) - Google Earth KML (Keyhole markup Language) version. Thus allowing plethora of users to interact with the map by selecting different map data layers or features to view, zooming into a part of the map they are interested in, inspecting feature properties, editing existing content or submitting new content, adjusting layer transparency, taking a screen capture etc.

**KEYWORDS:** Web mapping, Satellite Imagery, Georeferencing, Geospatial Technology, Layer.

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## 1 INTRODUCTION

A web map is an interactive display of geographic information, in the form of a web page that you can use to tell stories and answer questions. In the past, most digital geographic information was confined to specialized software on desktop PCs and could not be easily shared. With the advent of web mapping, geographical information can be shared, visualized, and edited in the browser. The most important advantage to this is accessibility: a web map, just like any website, can be reached by anyone from any device that has an internet browser and an internet connection.

The term “Web mapping” constitutes both the technology and art of sharing maps on the Internet. The simplest Internet-based maps are static, such as images (i.e., jpegs or tiffs) that do not allow users to change the components, extent, or appearance of the map. These maps are the easiest and simplest to share because all that is required is placing the image on a Web server and telling others where to find it. At the opposite end of the spectrum are customizable, interactive Web-based maps. These maps are usually created with the use of modern hardware, complex software. In addition, these initiatives require human expertise for successful implementation.

Web maps are interactive. The term interactive implies that the viewer can interact with the map. This can mean selecting different map data layers or features to view, zooming into a particular part of the map that you are interested in, inspecting feature properties, editing existing content, or submitting new content, and so on.

Web maps are also said to be powered by the web, rather than just digital maps on the web. This means that the map is usually not self-contained; in other words, it depends on the internet. At least some of the content displayed on a web maps is usually loaded from other locations on the web, such as a tile server.

Web maps are useful for various purposes, such as data visualization in journalism (and elsewhere), displaying real-time spatial data, powering spatial queries in online catalogs and search tools, providing computational tools, reporting, and collaborative mapping.

Geospatial technology encompasses the capturing, entering, storage and integration of data from several sources and by adopting different methods or techniques. “A Geographic

~~Information System (GIS) is a computer system for capturing, storing, querying, analyzing, and displaying geospatial data” (Kang-tsung Chang 2018). “GIS is a computer-based information system which attempts to capture, store, manipulate, analyze and display spatially~~  
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referenced and associated attribute data for solving complex research, planning and management problems.” (S. K. Duggal 2009).

This paper focused on producing a web map. A web-based application was designed for Abia State Polytechnic, campus. Figure 1 shows a basic diagram of how an end user requests a map through a web mapping site and what happens behind the scenes.

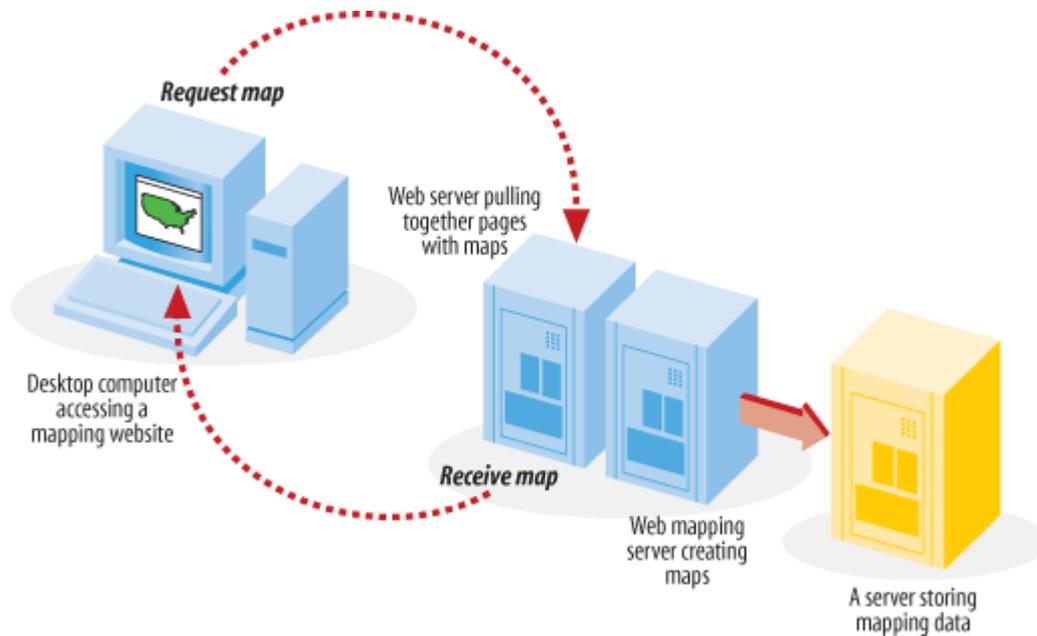


Figure 1. A diagram of how a mapping web site interacts with the end user and the back-end programs running on the servers

The huge challenge of not having a robust interactive web map was due to lack of integrated server with the environment. Even though web map of the campus was produced, it is rather an enormous task.

## 2. STUDY AREA

The study area is Abia State Polytechnic Campus. The polytechnic is located in Aba North L.G.A. of Abia State. The study area is located within the geographical coordinates of between latitude 5°06’N and 5°07’N and between longitude 7°21’E and 7° 23’. The map of Abia State and that of the Abia State Polytechnic campus (on google earth background) are shown in figures 2 and 3 respectively.

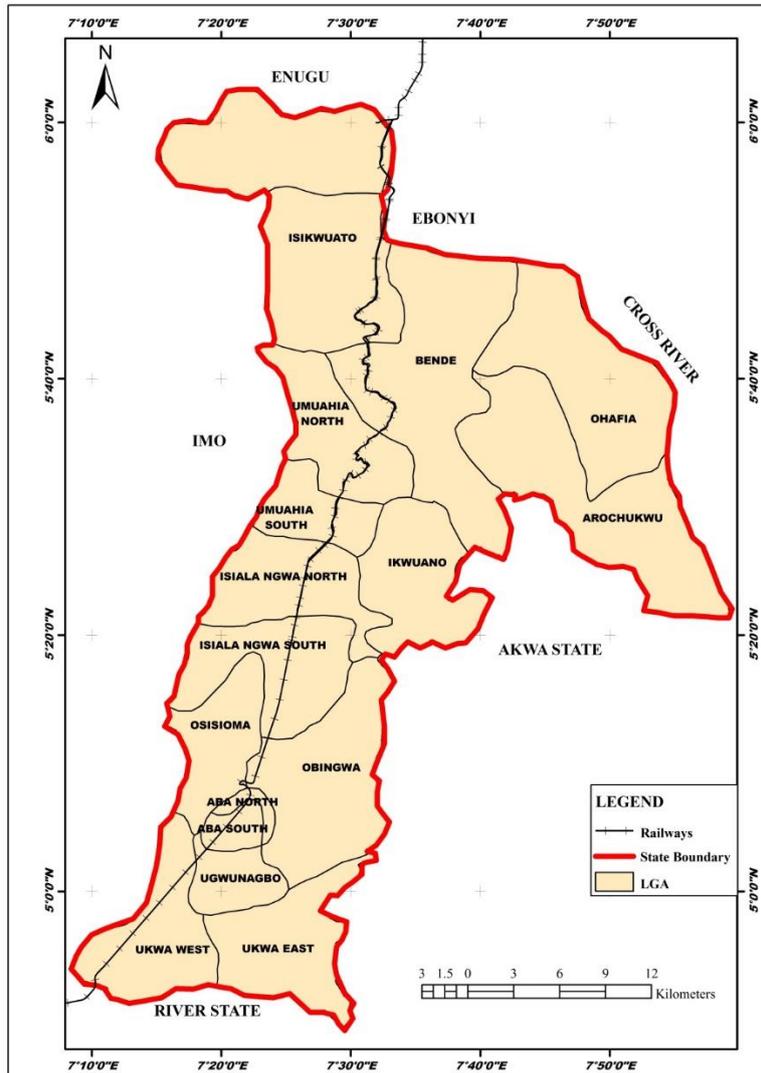


Figure 2. Map of Abia State

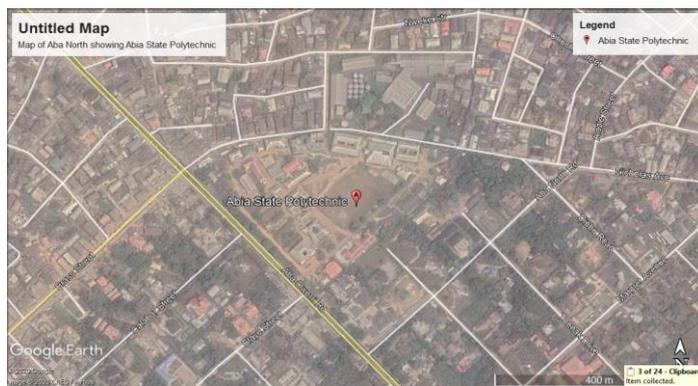


Figure 3. Map of Aba North showing Abia State Polytechnic on google image background.

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### 3. DATA AND METHODOLOGY

The combination of data from different sources to a large extent have simplified the representation of geographic entities. This research work undertook several of these approaches. Remote Sensing method, direct observation of spatial object location via GPS and social survey for comprehensive attribute of geographic phenomena present within the study area were all adopted for this project.

#### 3.1 DATA NEEDS

The data needed to carry out this project effectively are:

- ✓ Google satellite imagery of the study area.
- ✓ Positional data (co-ordinates of points) of features locations such as buildings and salient features were obtained by GPS observations.
- ✓ Social surveys were conducted in order to determine the attribute data (descriptive information) of the existing spatial elements within the study area.

#### 3.2 HARDWARE AND SOFTWARE REQUIREMENTS

The hardware for this project includes:

1. Promark3 GPS for the verification and acquisition exercise of the primary source of our data. This GPS (Promark3 GPS) was used for the acquisition of the vector data i.e Northing (N) and Easting (E) coordinates for the mapping of the locations showing the study area.

2. HP Pavilion dv3 with the following configuration/properties was used:

Processor: Intel® Core™2 Duo CPU T6500 @ 2.10GHz

Installed Memory (RAM): 4.00GB

System Type: 64-bit operating system, x64-based processor

Main Memory: 500 GB

DVD/CD Reader/writer

Flat screen VDU

HP Jet plotter.

Also the software used for the production of the interactive web map of the campus includes: Quantum GIS (QGIS) 3.6, Google Earth, Microsoft Excel and Microsoft word.

#### 3.3 BASE MAP

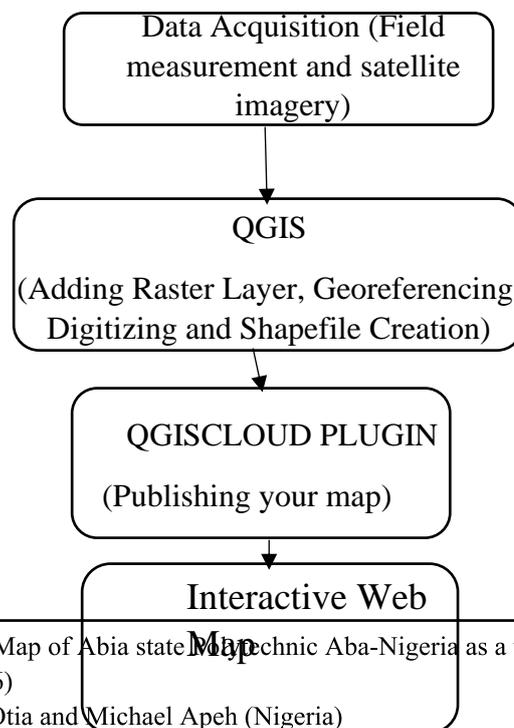
~~The base map provides geographic context for the interactive map of Abia State Polytechnic, campus by helping in the interpretation of the map. Google earth was used as the base information for this project owing to its enormous advantage and spatial influence in the geoinformation super highway. The remotely sensed image ease the production and interpretation of the interactive map of the Abia state Polytechnic campus.~~

### 3.4 ACQUISITION OF FIELD DATA

The field data was acquired using a Promark-3 Differential GPS. The data acquisition was done this way: the instrument, Promark-3 Differential GPS was signed out from the Surveying and Geo-Informatics Department Stores, and then taken to the field. Through the help of the recce diagram, features such as buildings, electric poles, roads were picked as point coordinates. For the buildings, the instrument was placed at the center and then allowed to get satellites signals and thus was placed there for about two minutes before the X and Y Coordinates were taken (recorded into the field book). The attribute of the buildings was also documented and used for the population of the database. Field definitions such as type of object, object name, object ID, object status, object coordinate (easting, northing) were considered at the stage of data acquisition and preliminary planning.

### 3.5 GEOREFERENCING AND DIGITIZING

In order to "tell" a raster map where it "lives" in the world, the process of georeferencing is inevitable. Georeferencing is the process of assigning real-world coordinates to each pixel of the raster. These coordinates were obtained by observed coordinates with Promark 3 Differential GPS. Prominent features that were easily noticeable on the google earth were identified and their rectangular coordinates (easting and northing) taken. The Georeferencing was done in QGIS is done via the 'Georeferencer GDAL' plugin. The saved image in jpeg extension was attached via the georeferencer tool and all the appropriate parameters were included and standard procedures was followed to ensure that the existing real world coordinates were harmonized to the image coordinates of the study area. Conversely, the x, y coordinates of point, line and polygon features were recorded electronically and stored as the spatial data. The feature attributes were also populated during the digitizing process. Figure 4 describe the steps involved in the production of Interactive map of the campus.



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Figure 4. A SIMPLE WORK FLOW OF CREATING AN INTERACTIVE WEB MAP  
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## 5 CONCLUSION

A web map is an interactive display of geographic information, in the form of a web page, that you can use to tell stories and answer questions. In the past, most digital geographic information was confined to specialized software on desktop PCs and could not be easily shared. With the advent of web mapping, geographical information can be shared, visualized, and edited in the browser. The most important advantage to this is accessibility: a web map, just like any website, can be reached by anyone from any device that has an internet browser and an internet. Based on this research finding, the following conclusion can be drawn that a web map of the institution or other establishment is essential in this internet age as people could easily access it via their smart phones, tablets and desktops in as much as they have internet connections. It is worthy to conclude that the synergy between geospatial and World Wide Web has helped in a greater measure by providing opportunities for the global community to interact via the internet, share data and have access to information like never before.

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