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# Development of Univ. of San Agustin Geographic Information System (USAGIS)

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**Abstract.** For a University, it is necessary and important to let the planning department understand and realize the importance and benefits of the site and to establish long term development strategies for the institution. To aid the planning process, the information that flow must be well organized. In planning, a Geographic Information System (GIS) is a great tool. This paper explains the development process of the University of San Agustin (USA).

**Keywords.** Geographic Information System, Software Engineering, Development

## 1 Introduction

GIS or geographic information system is a computer system designed to store, capture, manipulate, analyze, present and manage all types of geographical data. The acronym GIS is sometimes used for geographical information science or geospatial information studies to refer to the academic discipline or career of working with geographic information systems and is a large domain within the broader academic discipline of Geoinformatics.[1] This work documents the development process of the geographic information system (GIS) for the University of San Agustin. The University of San Agustin is a catholic university in Iloilo City Philippines.

**Fig.1.** Satellite view of the University

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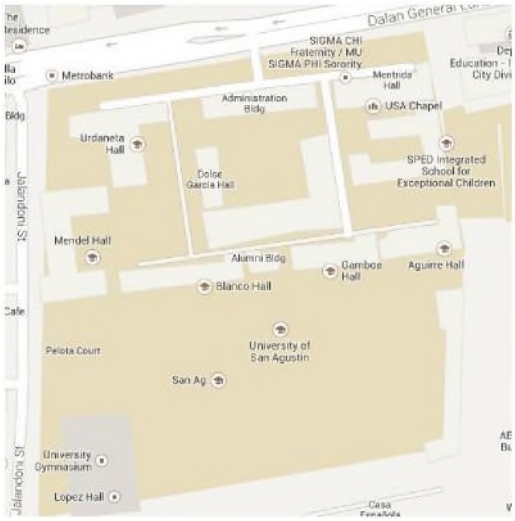


**Fig. 2.** Map of the University

## 2 Related Technologies

### *A. Geographic information system (GIS)*

GIS can be thought of as a system that provides spatial management, retrieval, analysis, visualization functions and data entry. The implementation of a GIS is often driven by jurisdictional , purpose, or application requirements. Generally, a GIS implementation may be custom-designed for an organization. A GIS deployment developed for an application, jurisdiction, enterprise, or purpose may not be necessarily interoperable or compatible with a GIS that has been developed for some other application, jurisdiction, enterprise, or purpose. What goes beyond a GIS is a spatial data infrastructure, a concept that has no such restrictive boundaries.

The term describes any information system that stores, integrates, edits, analyzes, shares, and displays geographic information for informing decision making. GIS applications are tools that allow users to create interactive queries, analyze spatial information, edit data in maps, and present the results of all these operations.[2][3] Geographic information science is the science underlying geographic concepts, systems and applications.[4]

GIS combines layers of information to provide a better understanding of the county and its municipalities. In a GIS, different types of features are contained in separate layers. Each layer deals with a different topic - roads, places, patterns of people, soil landscape data, or ecological zones; linked to both descriptive information and geographic references. Layers can be combined, to see how attributes

 

and locations interact or influence each other. In this work layers will include building, rooms and other objects inside the university

### *B. QGIS*

QGIS know before as Quantum GIS is a cross-platform free and open source desktop geographic information systems (GIS) application that provides data viewing, analysis capabilities and editing. [5]

Like other software GIS systems QGIS allows users to create maps with many layers using different map projections. Maps can be assembled in different formats and for different uses. [5] QGIS allows maps to be composed of raster or Vector layers. Typical for this kind of software the vector data is stored as either point, line, or polygon-feature. Different kinds of raster images are supported and the software can perform georeferencing of images.

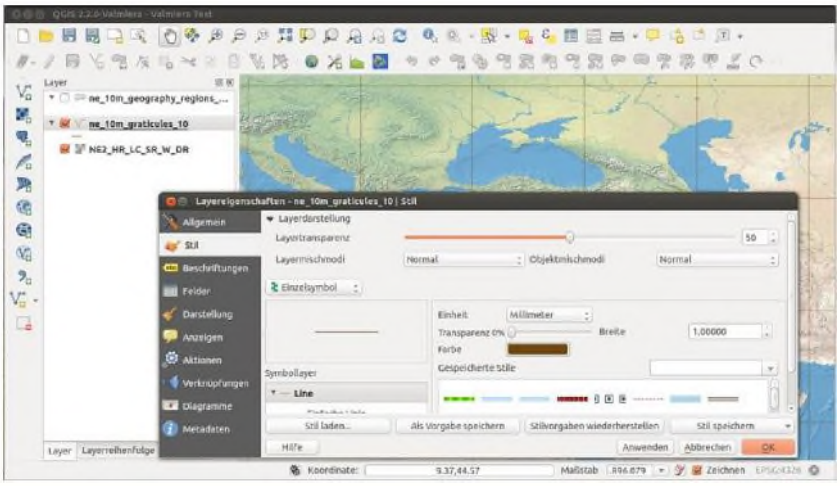


**Fig. 3.** QGIS Interface

QGIS provides integration with other open source GIS packages, including PostGIS, GRASS, and MapServer to give users extensive functionality.[6] Plugins, written in Python or C++, extend the capabilities of QGIS. There are plugins to geocode using the Google Geocoding API, perform geoprocessing (fTools) similar to the standard tools found in ArcGIS, interface with PostgreSQL/PostGIS, SpatiaLite and MySQL databases, and use Mapnik as a map renderer.

 

## 3 Development Process

### *C. Software Development Methodology*

Like other software development process, developing a GIS follows a development methodology.

In the case of this system, the waterfall methodology is used. The waterfall model was first defined by Winston W. Royce in 1970 and has been widely used for software projects ever since. Royce's original model is shown on figure 4.

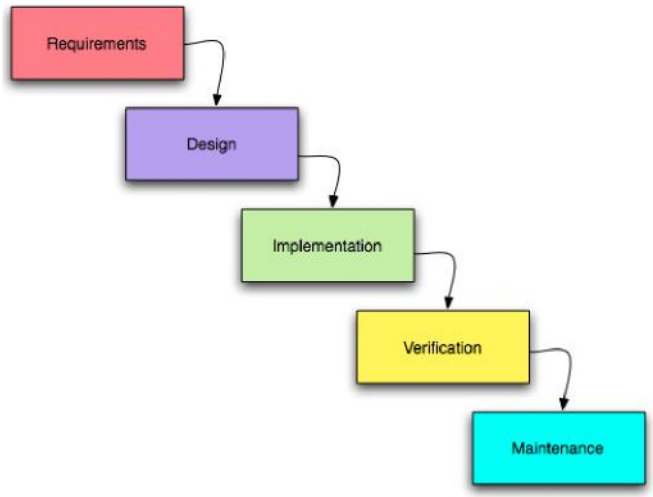


**Fig. 4.** The Waterfall Development Methodology

When using this methodology it is vital that all requirements are captured during the Requirements/design phase as it can be very expensive to re-visit requirements once implementation has begun.

When done well the waterfall method is excellent for large projects and there are no surprises when the application is finally delivered as all features and even the appearance of the application has been fully specified and understood by future users of the system. We've had great success with large projects using this method and can show potential clients excellent functional specifications produced for previous successful projects. If the requirements phase is done badly (and this is often the case when the business confuses shoddy requirements with faster progress) the waterfall method delivers failure as the end result will only ever be as good as the specifications.

### *D. Data*

Among the important data needed to develop a GIS is a base map. A birds eye view image of the university was captured to be utilized as the base map for this geographic Information System.

**Fig. 5.** The base Map

The University of San Agustin is composed of several buildings such as the Rada Hall, Aguiere Hall, Mendell Hall, Blanco Hall, Mercado Hall, etc. Each buildings was measured. The details were also noted.

| SPACES | LENGTH | WIDTH | AREA |
|---|---|---|---|
| GROUND FLOOR | | | |
| GRADUATE SCHOOL | | | |
| DEAN'S OFFICE | 3.88 | 3.65 | 14.14 |
| SEC | 5.50 | 3.64 | 20.02 |
| FACULTY ROOM | 4.80 | 4.55 | 21.84 |
| STAFF | 4.81 | 3.73 | 17.96 |
| GRADUATE SCHOOL MULTI PURPOSE ROOM | | | 0.00 |
| COLLEGE OF EDUCATION | | | |
| DEAN'S OFFICE | 4.79 | 4.00 | 19.16 |
| SECRETARY | 5.92 | 5.33 | 31.54 |
| KITCHEN | 3.31 | 2.03 | 6.71 |
| OFFICE | 3.90 | 3.31 | 12.91 |
| FACULTY ROOM | 6.12 | 6.02 | 36.81 |
| GUIDANCE OFFICE | 4.99 | 3.63 | 18.11 |

**Table 1.** Sample Building Data

The coordinates of several points in the university were taken. The coordinates are used to georeference the map in QGIS.


**Fig. 6.** GPS reading using GPS Status App

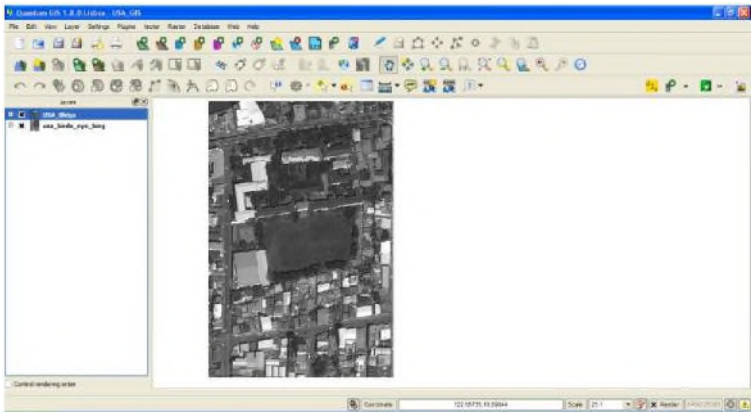

**Fig. 7.** Development of the USA GIS

## 4 Future Works

Another phase of this project is the analysis of data generated by the USA GIS.

## 5 Conclusion

This paper presents the study of the development process of the University of San Agustin Geographical Information System. In the work, Quantum GIS tools are used. Layers such us buildings, roads and classrooms were created.

Advances in information technology have made GIS powerful and cost-effective tools for land analysis, planning, and management. [7] Arlinghaus, 1994, stated the advantages of using GIS tools:

- Ease and speed of map revision and map scale changes
- Inexpensive production of short-run special purpose maps
- Potentially greater mapping accuracy
- Changes in the database are immediately reflected in digital map
- Spatial analysis

Phase 2 of this project is currently on-going.

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