AN ENHANCED 3D MAP FOR ISPSC SANTA MARIA MAIN CAMPUS WITH DEPLOYMENT

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A CAPSTONE PROJECT PRESENTED TO THE FACULTY OF THE
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Chapter I

INTRODUCTION

Project Context

In information technology, a 3d map animation is a small physical structure. More on 3d map animation let users interact which include, motion video and sound. The use of interactive 3d map animation allows visitors and freshmen with a simple method of finding their way to their destination as well as navigates buildings. The proponents wanted to enhance and create a 3d map animation for visitors and freshmen and others for ISPSC Sta. Maria Main Campus. It is designed to help the people have an easier way to locate the different buildings and departments in the ISPSC Sta. Maria, Ilocos Sur. (Froilan Ryo Santos Jr. May 2017)

As time goes by certain things and even places undergo some changes, like Ilocos Sur Polytechnic State College Main Campus, there are a lot in the school premises, new buildings and infrastructures built. Due to the changes and new built buildings and infrastructures in the school premise, and outdated manual directory of the campus, it is a burden and time consuming for the ISPSC old and new students, administration, employees and visitors to find and reach their destination inside the school premises which causes much delay.

After a year, new buildings and infrastructures was built and there are already new trends of technology which can help people make their work times three of faster and convenient, therefore the ISPSC 3D Map of Sta. Maria Main Campus Sta. Maria Ilocos Sur needs to be updated and upgraded. Due to the changes and evolution of technology, the researchers came up with an idea to upgrade and update the ISPSC 3D Map of ISPSC Main Campus Santa Maria, Ilocos Sur to An Enhanced 3D Map for ISPSC Santa Maria Main Campus with Deployment with the following special features with voice command. With the existence of this system and its updates and upgrades in just one click it will surely address the problems and struggles in finding and reaching their destination in the school premises easier and more convenient.

Using this 3D map, in order for them to be familiarized to the different buildings and offices in the campus easily instead of asking people, it has a button that navigates the location of each buildings and departments. The system was only limited on the ISPSC Campus.

A 3D map can be simply defined as a graphic representation. This representation is always an abstraction of reality. Maps are used to display both cultural and physical features of the environment. 3D map is a three-dimensional (3-D) data visualization that lets you look at information in new ways. 3D Maps let you discover insights you might not see in traditional two-dimensional interactive map. While the

enabling technologies for three dimensional (3D) mapping have been ready for some time, and the benefits are significant, one might expect that a wide adoption of three dimensional maps should already be happening. (3D_Terrain_Maps)

3D map, also known as video mapping and special augmented reality, is a projection technology used to turn objects, often irregularly shaped, into a display surface for video projection. These objects may be complex industrial landscapes, such as buildings, small indoor objects or theatrical stages. By using specialized software, of a two- or three-dimensional object is spatially mapped on the virtual program which mimics the real environment. The software can interact with a projector to fit any desired image onto the surface with that objects. This technique is used by artists and advertisers alike who can add extra-dimensions, optical illusions, and notions of movement onto previously static objects. The video is commonly combined with, or triggered by, audio to create an audio-visual narrative (jhall/EXCEL_3D_MAPS.pdf).

The 3D map and associated building, school, road etc. models are enabling the convergence of several established disciplines, are including engineering computer-aided drafting (CAD), architectural building information management (BIM). Multimedia cartography has been propelled forward by the rapid technological advances for the capture, manipulation and presentation of geographical data, with most map products now being developed digitally. The quality and accuracy of data

capture, capabilities, as well as advancements in software. Accurate, detailed and high-resolution three-dimensional maps and visualization. The advent of Digital terrain or elevation models make available the presentation of geographical data in three dimensional space, and allowing precise modeling of not only x and y locations, but z height creating a three- dimensional landscape. In the case of three-dimensional cartographic mapping, there are many different applications, like CAD, SKETCH UP 3D, ADOBE PHOTOSHOP, CINEMA 4D that have been designed for the creation of 3D maps and visualizations, and development of the standards and guidelines in regards to the technical aspects of such models. 3D maps can be photorealistic, where the landscape is created to match the exact landscape, using techniques of overlaying or thro-photography over 3D models, or can be "symbolist", where the maps are generalized and symbols designed to show object locations and information.

In this work, the researchers discussed the three dimensional (3D) interactive map in depth from both the theoretical and practical perspective, as well as to show the benefit for a number of applications, and identify some of the factors that inhibit their popularization. They defined 3D maps and three-dimensional cartography, and discuss its relations with the broader discipline of geo visualization also demonstrate that more 3D cartographic research would benefit users of maps, as well as those of GIS and geo visualization products.

Problem

Due to the changes and new built buildings and infrastructures in the school premises, and outdated manual directory of the campus, it is a burden and time consuming for the ISPSC old and new students, administration, employees and visitors to find and reach their destination inside the school premises which causes much delay. After a year, new buildings and infrastructures was built and there are already new trends of technology which can help people make their work times three of faster and convenient, therefore the ISPSC 3D Map of Sta. Maria Main Campus Sta. Maria Ilocos Sur needs to be updated and upgraded.

Purpose and Description

An Enhanced 3D map for ISPSC Santa Maria Main Campus with Deployment is also important for the students especially for the incoming freshmen to locate the sites of the different buildings and structures inside the college.

The capstone project would be beneficial to the following:

School Administration and Employees. The study would give the school, especially the administrators, an idea on how to make visible areas in the campus be recognizable especially to visitors who are new in the campus.

Visitors. The information 3D map benefits the visitors who are not familiar to the different offices and buildings of the college. This helps them to familiarize themselves to the different locations of the structures of the learning institution with the help of the 3D perspective of each building in school.

Students. Especially the freshmen, the system would give them an idea on the location of buildings. This serves a virtual map to them in locating classrooms and buildings which are not familiar to them.

Developers and Future Developers. The developers were able to enhance their programming skills by applying the theories they acquired during their schooling. This is the best time that they are able to apply their knowledge on the manipulation of different software especially in editing and putting animation. For future developers, this would be the basis in coming up with another researcher with the integration of new features which will suit the technology of the present time.

Review of Literature

Throughout history, geographic information has been authored and presented in the form of two-dimensional maps on the best available flat surface of the era—scrawled in the printed paper, and finally onto computer screens in all their current dirt, on animal skins and cave walls, hand-drawn on parchment, then onto mechanically shapes and sizes. Regardless of the delivery system, the result has been a

consistently flat representation of the world. These 2D maps were (and still are) quite useful for many purposes, such as finding your way in an unfamiliar city or determining legal boundaries, but they're restricted by their top-down view of the world.

Three-dimensional depictions of geographic data have been around for centuries. Artistic bird's-eye views found popularity as a way to map cities and small-extent landscapes that regular people could intuitively understand. But because these were static and could not be used directly for measurement or analysis, they were often considered mere confections, or novelties, by serious cartographers, not a means of delivering authoritative content.

However, this is no longer the case since ArcGIS introduced the concept of a "scene," which is actually more than just a 3D map. In a scene, you can also control things like lighting, camera tilt, and angle of view. The mapmaker can craft a scene that creates a highly realistic representation of geographic information in three dimensions, which provides an entirely new way for the audience to interact with geographic content. Spatial information that is inherently 3D, such as the topography of the landscape, the built world, and even subsurface geology, can now be displayed not only intuitively and visually but also quantifiably and measurably, so that we can do real analysis and hard science using 3D data (arcgis-book/chapter6/).

The Advantages of 3D mapping are Vertical information, Intuitive symbology, Showing the real world bird's eye views, and Human Style navigation.

Vertical information, the most obvious advantage of a scene is its ability to incorporate vertical (and thus volumetric) information—the surface elevation of mountains, the surrounding landscape, the shapes of buildings, or the flight paths of jetliners. It's the power of the Z.

Intuitive symbology, in 3D, the extra dimension enables you to include more readily recognized symbols to make your maps more intuitive. You are able to see all the "data" from all viewpoints in situ. Every symbol that you recognize on a map saves you the effort of referring to the legend to make sure you understand what it shows.

Showing real-world, bird's-eye views, many of man's earliest maps, particularly of cities and smaller human habitations, were portrayed as scenes. These stylized maps were created as static 3D bird's-eye views and were successful in providing understanding of a place. Today's GIS authors interact with and see these scenes from many perspectives.

Human-style navigation, for most of our living moments, we experience the world within a few feet of the ground. 3D allows us to replicate this view. With data presented from this approachable perspective, the size and relative positions of objects are intuitively

understood as you wander virtually through the scene. There's no need to explain that you're in a forest or that a lake is blocking your route—the 3D perspective immediately makes the features recognizable (arcgis-book/chapter6/).

The Disadvantages of 3D mapping are Lack of Control, Learning Approach, Technology Issues, and Computer Competency.

Lack of Control, learners with low motivation tend to fall behind when using 3D map as there are not set times to be doing it and are responsible for the organization themselves. A lack of routine or fixed schedule can mean 3D map becomes complicated with various deadlines often given to different people at different stages of their learning.

Learning Approach, it does not appeal to all 3D map style so some learners will not enjoy the experience – especially strong activist and pragmatists. It is still a challenge to make 3d map appeal fully to these groups as different people learn better or worse using different styles. Some may prefer images, some prefer just reading words and some prefer to talk about or actually do a task in order to learn.

Technology Issues, with heavy reliance on computer that 3D map brings, comes a potential risk. Firstly, the user needs to ensure that all the device that is able to support the training modules. Some 3D map tools require software such as flash that devices like iPads do not support. So, all requirements need to be set out at the beginning. Poor

internet connection and unavoidable genera random faults also can interrupt learning and so need to be planned around. This is especially true if is a global roll out as internet connection and power reliability changes dramatically between countries.

Computer Competency, some employees might not be too comfortable using computer, especially if their jobs don't require them to. Therefore, the software can be daunting and demotivating for some. Therefore, these employees are likely to learn a lot less than they would from a physical course.

According to Lewis and Clark Expedition, this map is a mosaic of several historical and modern maps of the area align the Lewis and Clark expedition route the 1814 original expedition covering the route itself, then just beyond it the USA GLO maps from 1866-79, then the US national atlas map and 1970, and finally the entire map is bordered with current satellite imagery of the us west. In this 3D GIS version of the map the scanned historic map image is combined with the modern day USGS DEM (Digital Elevation Model), allowing us to "warp" the historic map image into 3D.

Rapid 3D Mapping is a stereo photogrammetry technology developed by the Swedish defense and security company Saab. The system generates three-dimensional maps by image captures of the terrain from a manned aircraft, helicopter and/or UAV. Rapid 3D mapping makes it possible to generate a three-dimensional map within

hours of the flight, the results depends on the existing sensors available on the aircraft. The typical coverage for an airplane is 100 square kilometers per hour with a resolution of 0.1m at ground level (Rapid_3D_Mapping).

Technology training is excellent way to provide teachers with the confidence to incorporate technology into their school. Area of training can include anything from graphic organizing software, to presentation software to video and sound production software. Some pictures may also be interested in learning about data bases, spreadsheet, and word processing software (Lacina, 2009).

Objectives

The study aims to develop and enhance an Animated Three Dimensional (3D) map for Ilocos Sur Polytechnic State College, Sta. Maria Main Campus.

Specifically, it sought to achieve the following objectives:

1. To determine the hardware and software requirements for creating an enhance 3D map for ISPSC Santa Maria Campus with deployment;

2. To design and create an enhanced 3D map for ISPSC Santa Maria Main Campus with Deployment; and

3. To test the usability of the enhanced 3D map animation for ISPSC Santa Maria main campus in terms of:

a) Acceptability,

b) Helpfulness,

c) Usefulness, and

d) Usability.

Scope

The study was conducted at Ilocos Sur Polytechnic State College Sta. Maria Main Campus, Sta. Maria Ilocos Sur from December 2017 to March 2018.

This study aimed to create and guide the students, employees, school administrators, and visitors and other staff of the campus using this 3D map in order for them to be familiarized with the different buildings and offices in the campus easily instead of asking people, it has a button that navigates the location of each buildings and departments.

The researchers used editing or authoring tools in the development of the project such as: Sketch up 3D, Lumion 6.0, Video Maker, Wondershare Video Editor, Adobe Premier Pro and Adobe Photoshop. These were used in the development of the modules.

Limitations

The system was only limited for the ISPSC Campus. The limitation of the study does not include the outside surroundings of the school. It

Chapter II

METHODOLOGY

Development Model

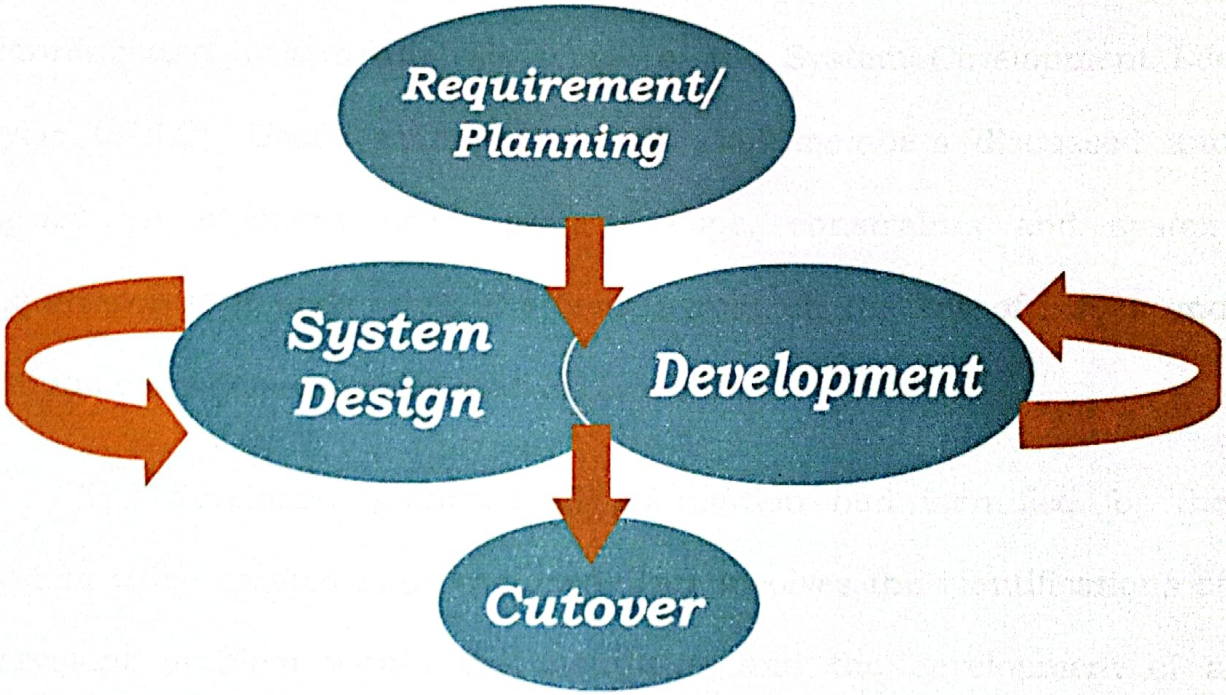

Figure 1. Rapid Application Development (RAD)

This describes the method of software development which heavily emphasizes rapid prototyping and iterative delivery. The RAD model is, therefore, a sharp alternative to the typical waterfall development model, which often focuses largely on planning and sequential design practices

By utilizing a rapid application development method, designers and developers can aggressively utilize knowledge and discoveries gleaned during the development process itself to shape the design and or alter the software direction entirely (https://airbrake.io/blog/sdlc/rapid-application-development).

The Phases of the Rapid Application Development (RAD) are:

Requirement/Planning Phase

Requirement/Planning phase combine the elements of system planning and system analysis phase of the System Development Life Cycle (SDLC). User's manager and IT staff members discussed and agreed on business need, project scope, constraints and system requirements. It ends when the team agrees on the key of issues and obtains management authorization to continue.

The developers gathered all information had identified for the system to be created and developed. This involves the identifications of prevalent problem within the institution and the development of a system.

System Design

The second phase of the model was considered as the most crucial part. On the phase, the researchers decided on how they will go through the system.

During the phases, users interact with the system analysis and develop modules and prototypes that represent all system processes, inputs, and outputs. User design is continuous interactive process that allows users to understand, modify, and eventually working model of the system that meet their needs.

Development

The final phase includes testing of the system and training the client for him/her to utilize the use of the system. This phase resembles the tasks in the SDLC implementation phase, including data conversation, testing, and change cover to the new system and user training compared with traditional methods, the entire process is compressed.

As result, the new system built, delivered, and placed operation much sooner. The developers released an alpha version for testing and then the release the system to clients.

Cutover

Resembles the final tasks in the SDLC implementation phase, including data conversion, testing, changeover to the new system, and user training. Compared with traditional methods, the entire process is compressed. As a result, the new system is built, delivered, and placed in operation much sooner (Rapid_application_development).

The Advantages of Rapid Application Development (RAD) include: 1.) Better quality, 2.) Risk control, 3.) More projects completed on time and within budget.

1.) Better quality, by having users interact with evolving prototypes, the business functionality from a RAD project can often be

much higher than that achieved via a waterfall model. The software can be more usable and has a better chance to focus on business problems that are critical to end users rather than technical problems of interest to developers.

2.) Risk control, although much of the literature on RAD focuses on speed and user involvement a critical feature of RAD done correctly is risk mitigation. It's worth remembering that Boehm initially characterized the spiral model as a risk based approach. A RAD approach can focus in early on the key risk factors and adjust to them based on empirical evidence collected in the early part of the process. E.g., the complexity of prototyping some of the most complex parts of the system.

3.) More projects completed on time and within budget, by focusing on the development of incremental units the chances for catastrophic failures that have dogged large waterfall projects is reduced. In the Waterfall model it was common to come to a realization after six months or more of analysis and development that required a radical rethinking of the entire system. With RAD this kind of information can be discovered and acted upon earlier in the process (Rapid_application_development).

Project Plan

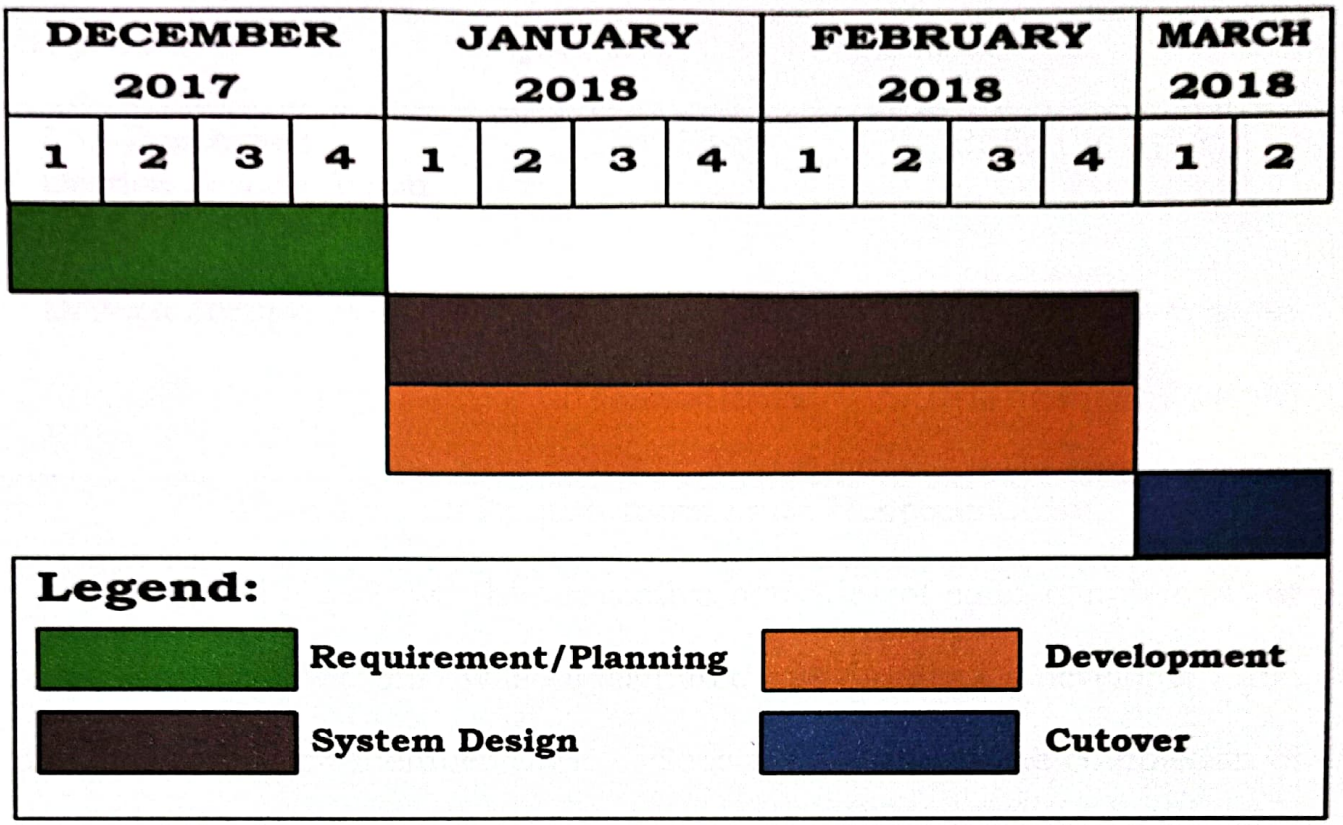

Figure 2. Gantt Chart Activities

A project plan is a formal document designed to guide the control and execution of a project. A project plan will provide a definition of the project, including the project goals and objectives. Additionally, project plan is the key to a successful project and is the most important document that needs to be created when starting a project.

Figure 2 also shows the timeline of activities in the completion of the project. It can be seen from the figure that the construction of the system takes the longest period of time because this activity requires more time in coding and putting videos and related information for the topic and to the system.

Project Team Assignment

Proponents	Project Role	Task
Ron-Ron Ayson Derrick Joseph Ayson Jonas Ayson	Developer	Build the System
Derrick Joseph Ayson	Analyst	Analyze the System
Rondalle Salvador/ Edgar Elefante	Documenter	Framework Content

Table 1: Role Requirements and Responsibility

Project Role shows the respective activities of each member of the team. Each of them was designated as analyst, developer and documenter. Each member worked closely together for the completion of the project. The analyst and developer worked with the development of the project while the documenter is responsible in taking note of the progress of the project and be the one responsible in the write up of the manuscript.

Data Gathering Procedure

Data were gathered using interview, document analysis, observation, internet searching and questionnaire. The requirement was based on the manual system being analyzed, improvements were identified and the concept of the an Enhanced 3D map for ISPSC Santa Maria Main Campus with Deployment

Different methods of data gathering procedures were employed in the project understanding to secure the data.

Survey. The researchers interviewed and surveyed some of the 10 faculty members and 30 students from all departments and the teachers from ISPSC Santa Maria Main Campus, Santa Maria, Ilocos Sur.

Documentary analysis. The proponents determined the forms which were used as input to the system. Furthermore, reports from the offices and other printed materials were also analyzed as supplementary materials.

Instrumentation. The proponents utilized the USE questionnaire which is a tool for user experience to relate the actual experience for the visitors to test the usability of the developed system.

Data Categorization. Below is the data categorization as to scale, statistical range and descriptive rating.

Scale	Statistical Range	Descriptive Rating
5	4.21 - 5.0	Strongly Agree
4	3.41 – 4.20	Moderately Agree
3	2.61 – 3.40	Undecided
2	1.81 – 2.60	Moderately Disagree
1	1.0 – 1.80	Strongly Agree

Table 2. Statistical Range and Descriptive Ratings

Table 2 shows the rating scale used for the assessment of the developed software with its corresponding descriptive rating. Based from this information gathered, the mean of the rating per item were calculated and described based on the table presented above. The class width was computed as (HS-LS) 5.

Or highest score (HS) minus Lowest score (LS) divided 5. Since there are five scale ratings. The computed class width is .80, which gives the first class interval 1.0-1.80 1.81-2.60 for the second-class interval and so on.

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