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Agri Demo Farm Mapping With Geoferencing

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Abstract: The study aimed to develop a Central Philippines State University Agri-demo farm mapping with georeferencing using a free mapping application programming interface by Google map API integrated with the Leaflet library. The system allows users to provide comments and ratings for the demo farms. The researcher followed a developmental research methodology agile approach model under the software development life cycle to create the system. Evaluation using 8 characteristics of the Software Quality Model from ISO/IEC for IT experts and 5 characteristics of Quality in use of ISO/IEC for users showed that the developed system was usable and of good quality. It is recommended to be adopted by the university, with future researchers adding functionality or features based on their objectives and upgrading the map since the researcher used only the free version of Google Maps.

Keywords: Agile, Agri-Tourism, Demo farm, Geoferencing, Mapping, Web-based.

INTRODUCTION

Demonstration Farms or demo farms have been existing for almost two centuries now. It is designed to showcase the beauty of farming and the many possibilities that it could offer. Also, to provide hands-on training with the evolving ways in farming, different techniques, and new crops, and to learn various useful subjects. Many public and private organizations, communities, schools, and even cooperatives have established demo farms for different purposes and in different contexts making it valuable to be a subject for researches.

In a study conducted by Sukanta Sarkar in 2010 entitled “Agri-Tourism in India: A Way of Rural Development”, demo farms became a part of Agri-tourism as a “farm-creation” that contributed to the enhancement of the quality of life in the communities by expanding recreational opportunities, diversifying economic bases and promoting the retention of agricultural lands. The study presented how Agri-Tourism, basically on farms, became one of the latest concepts in the Indian tourism industry, that attract travelers or visitors to an area primarily for agricultural purposes, to have a taste of local genuine food and get familiar with various farming tasks.

Presently, the university has no online website or system intended to promote or disseminate further instructions. Moreover, interested clients prefer a platform that accesses information on the demo farms and has a glimpse of what they should expect on-site.

These problems can be a hindrance to the university's goals to promote their different Agri demo farms. With this, the researcher aims to develop a web-based system that addresses all the problems identified. On the study of Pascual, J. An et.al, (2018) they state that “the emergence and implantation of georeferencing and geolocation technologies have exponentially increased the social communication of old cartographic and photographic documentation". Based on the findings of their case study, information can be conveyed more by displaying images or graphics. Thus, The CPSU Agri demo farm mapping with georeferencing will have the following

modules: geo-mapping includes lists of all demo farms by different campuses with their adapted demo farms, georeferencing; a module will provide the aerial overview of the demo farms, blogging system; where information can be view and access.

OBJECTIVES

This study will generally aim to develop CPSU Agri demo-farm mapping with georeferencing. Specifically, it aims to:

1. Develop a system that will:
    a. Provide the relevant information of demo farms.
    b. Map the location of demo farms.
    c. Allow users to post comment or suggestion to the demo farms.
2. Determine the usability of the develop system in terms of user's satisfaction and effectiveness.
3. Determine the quality of the developed system based on ISO/IEC 25010:2011 Systems and Software Quality Requirements and Evaluation (SQuaRE) Quality Model.

Conceptual Framework of the Study

Operationally and as defined in ISO/IEC 25010 Software Quality Model standards, this denotes the degree to which the system can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.

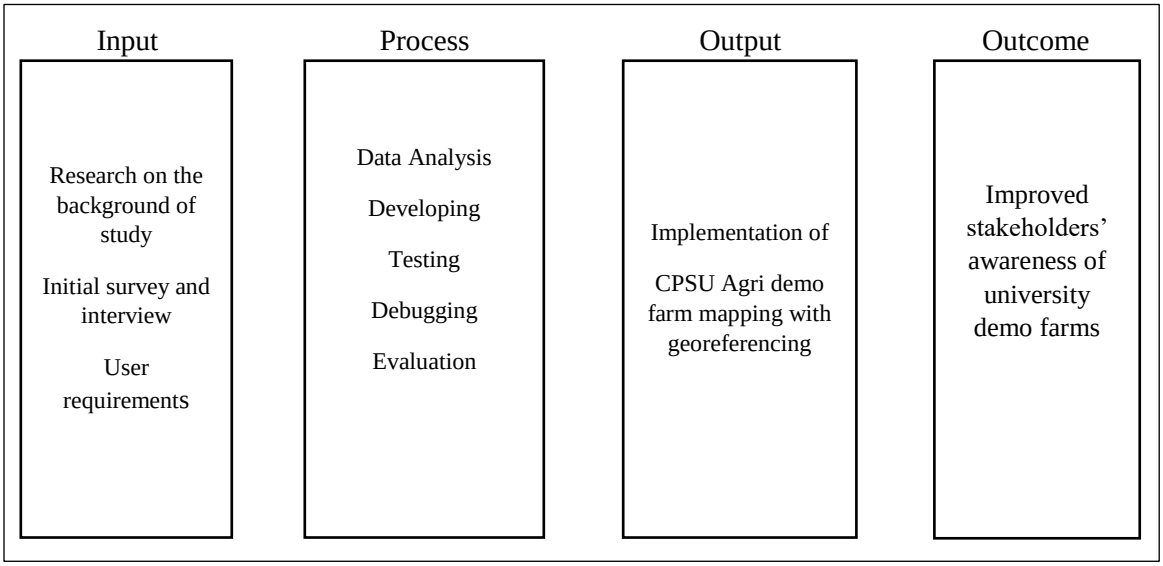

Figure 1.0: Conceptual Framework of CPSU Agri Demo Farm with Geoferencing

METHODS

Research Design

In this study, the research study utilized the Agile Model approach within the Software Development Life Cycle (SDLC) to design and develop the Central Philippines State University Agri-Demo Farm Mapping with Georeferencing system. The study employed the Developmental Research methodology and gathered data through interviews with university personnel, informal interviews to identify objectives, and evaluation tools based on ISO/IEC 9126-1:25010 Software Quality Model for feedback from guests, students, and school personnel.

Instrument

The instrument used in this study is the Good and Scates Validation Instrument, which includes criteria for evaluating survey questionnaire items.

GOOD AND SCATES VALIDATION INSTRUMENT

Juror: _____

Instruction: Please indicate your degree of agreement or disagreement on the statements provided below by checking the box which corresponds to your answer. The statements are taken from the criteria for evaluating survey questionnaire set forth **by Carter V. Good, and Douglas B. Scates**.

5 –Strongly Agree **4 –Agree** **3 –Undecided**

2 –Disagree **1 –Strongly Disagree**

Criteria:

Criteria	**5**	**4**	**3**	**2**	**1**
1. The items in the instrument are relevant to answer the objectives of the study.					
2. The items in the instrument can obtain depth to constructs being measured					
3. The instrument has an appropriate sample of items for the construct being measured.					
4. The items and their alternatives are neither too narrow nor limited in its content.					
5. The items in the instrument are stated clearly.					
6. The items on the instrument can elicit responses which are stable, definite, consistent and not conflicting					
7. The terms adapted in the scale in the scale are culturally appropriate.					
8. The layout or format of the instrument is technically sound.					
9. The responses on the scale show a reasonable range of variation.					
10. The instrument is not too short or long enough that the participants will be able to answer it within a given time.					
11. The instrument is interesting such that participants will be induced to respond to it and accomplish it fully.					
12. The instrument as a whole could answer the basic purpose for which it is designed.					
13. The instrument is culturally acceptable when administered in the local setting.					

Comments:_____
_____
_____

_____

Signature over Printed Name

Date

Data Gathering Procedure

The researcher gathered data for the development of the research project. An interview was carried out by the CPSU with campus personnel to discuss the current procedure, including any issues they encounter. The researcher also conducted an informal interview to understand the goals and objectives of developing the system. The data gathered by the researcher was used to design the application.

Data Analysis

The researchers used mean to assess and evaluate the functional suitability, performance efficiency, usability, maintainability, and portability of the CPSU Agri Demo Farm Mapping with Geoferencing. The collected data was discussed by the researcher for the development of the system. The researcher also included all the detail steps and work plan to make sure that the idea of the system development work smoothly.

Software Development Life Cycle (SDLC)

The researcher used the Agile Model approach as the Software Development Life Cycle (SDLC). This method serves as the basis in terms of planning, analysis, design, coding and testing. The researcher used the descriptive research design to determine the respondents' evaluation of the CPSU Agri demo farm mapping with georeferencing.

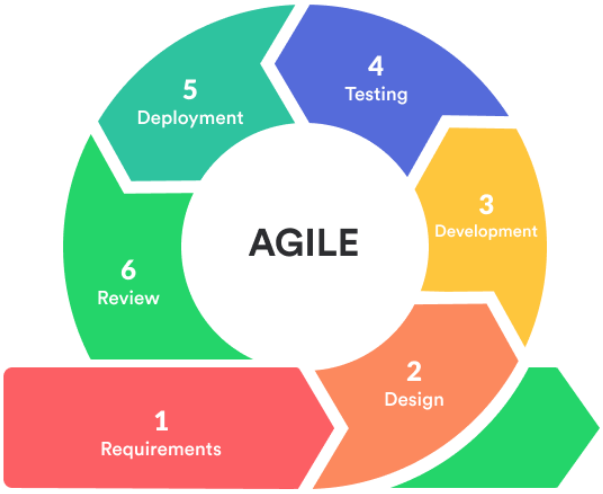

Figure 2.0: Agile Software Development and Life Cycle Model

System Design

In this phase, the researcher discussed about the process to develop the system from beginning to the end. It also explains the process, features and design of the CPSU Agri-Demo farm mapping with georeferencing.

Development

At this stage the design specifications were converted into the line of codes. The researcher evaluated the system design and the information gathered during the gathering stage. The system develops through HTML PHP (Hypertext Preprocessor), (Hypertext Markup Language), CSS (Cascading Style Sheet), JavaScript, MySQL version 7.3.

Testing Phase

In this phase of the study, the system that was developed was evaluated by guests, students, and school personnel of Central Philippines State University. The evaluation tool used was based on the standard ISO/IEC 9126-1 software quality model. The researcher also created a separate questionnaire for non-IT respondents, which utilized a system usability scale developed by John Brooke.

Implementation

After the evaluation, the system was implemented in this phase. The researcher ensured the functionality and capability of the system works, the hardware and software of the system and conduct a demonstration to the user

administrator of the system.

Maintenance

In this stage, the researcher conducted a survey to make sure that the system works and meets the requirements of the end user.

RESULTS AND DISCUSSION

A. System Interface

The Graphical User Interface (GUI) was created to meet the project's requirements, as indicated below.

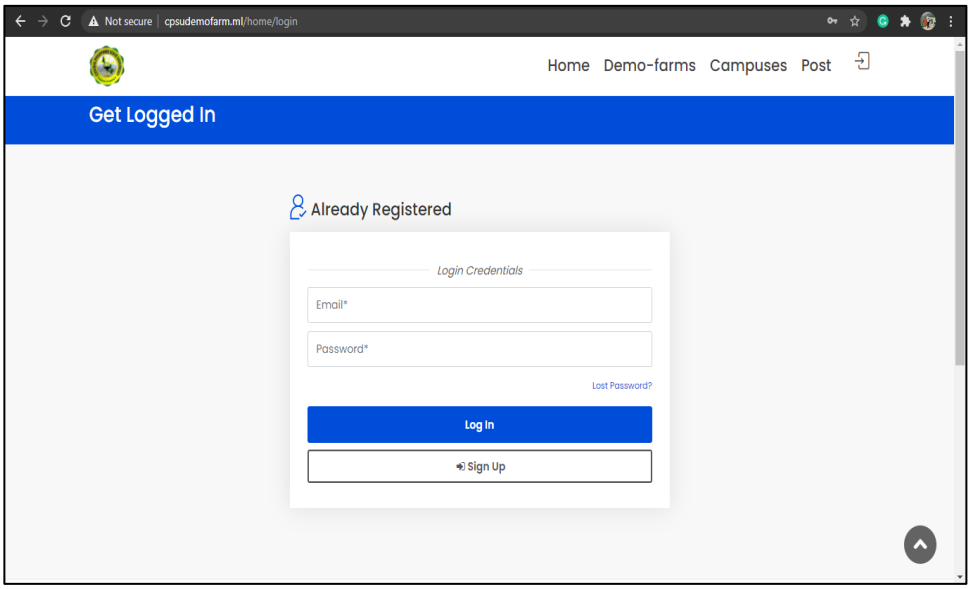

Figure 3. Log in Page

In Login Panel, a guest can create an account by clicking sign-up button. Every user must input the account credential to grant permission for accessing the system.

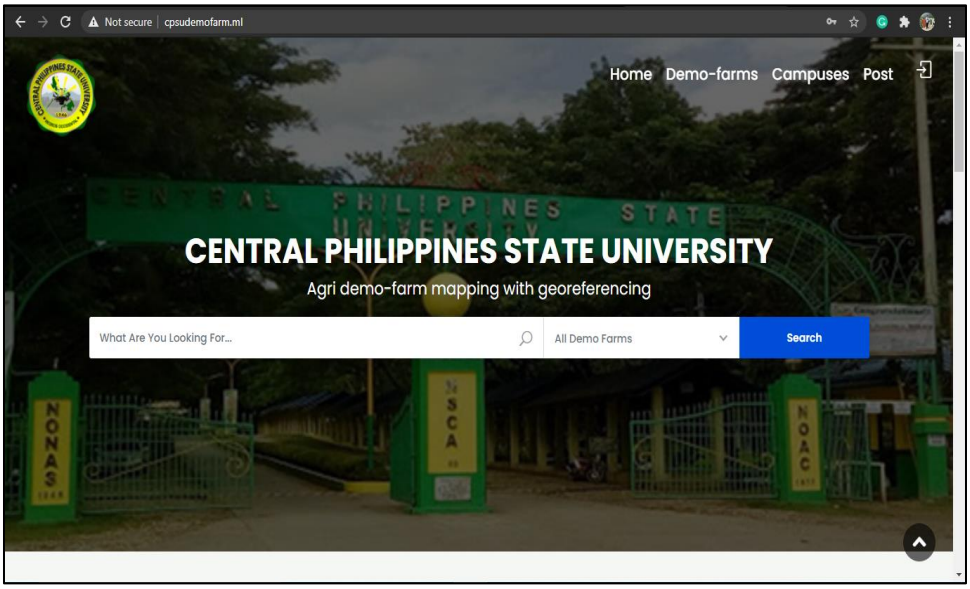

Figure 4. Home Page

In home page, the user can search related to the demo farm and can view the map into map view and grid view.

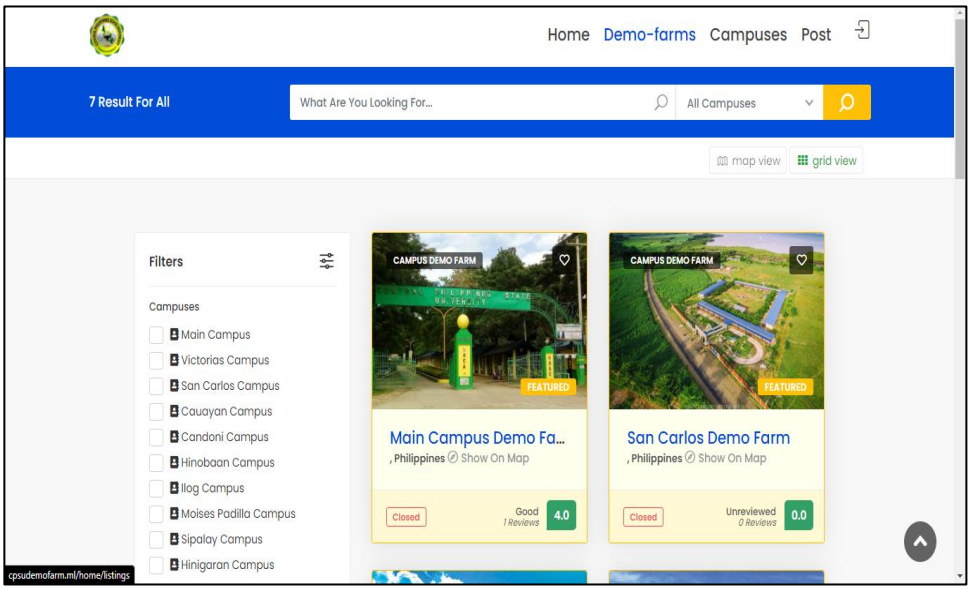

Figure 5. Demo-farms page

By clicking the button "grid view" it indicates the filter menu and the list of the demo farms in a page.

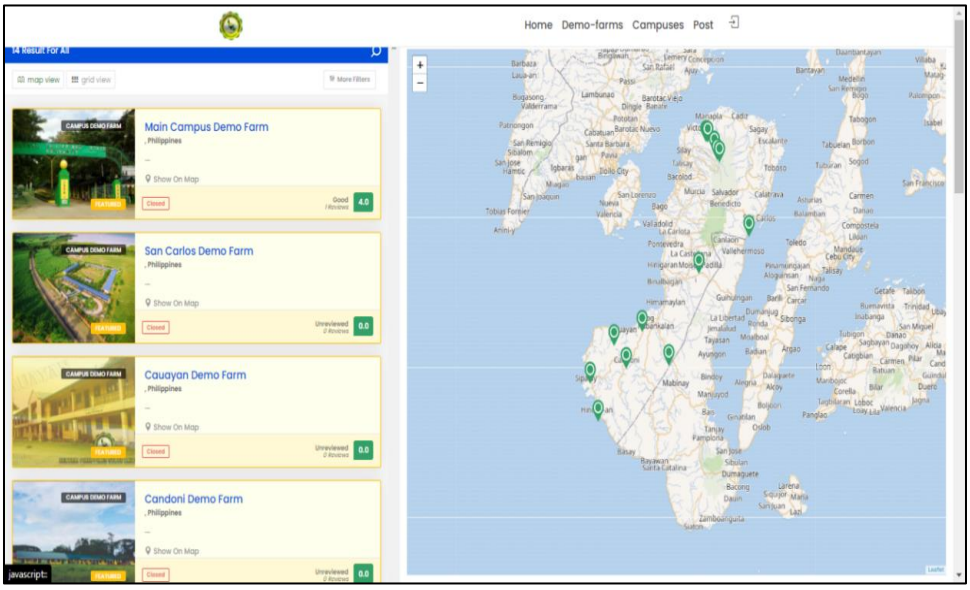

Figure 6. Map View page

By clicking the button "map view" it navigates the list of demo farms and its actual location on the map area.

B. Application Evaluation Result

The result was of 4.41, which was interpreted as very good. Based on the evaluation conducted by the experts from the IT Industry using the ISO/IEC 25010 Software Quality Model Characteristics.

Criteria	Mean	Verbal Interpretation
Functional Suitability	4.53	Very Good
Performance Efficiency	4.4	Very Good
Compatibility	4.5	Very Good
Usability	4.36	Very Good
Reliability	4.35	Very Good
Security	4.44	Very Good
Maintainability	4.52	Very Good
Portability	4.26	Very Good
Total	**4.41**	**Very Good**

Table 1.0 Evaluation Result on the Quality of the System Based on Software Quality - ISO/IEC 25010.

The Functional Suitability the system was rated 4.53, which was interpreted as very good in terms of functional completeness, correctness, and appropriateness. It indicates that the system provides accurate results and covers all the objectives and tasks of the users. On Performance Efficiency, the system got a rate of 4.4, which is also interpreted as good in terms of time behavior, resource utilization and Capacity. It shows that the system was efficient enough when it comes to responses and processing when performing its functions. Compatibility with the average of 4.5, which was interpreted as very good in terms of co-existence and interoperability. It states that the system can co-exist with other applications in the same environment. On the Usability, the system was rated 4.36, which was interpreted as very good in terms of Appropriateness, recognizability, learnability, operability, user error protection, user interface aesthetics and accessibility. It shows that system was easy to use and have a satisfying user interface. Reliability got a rating of 4.35, which was interpreted as very good in terms of maturity, availability, fault tolerance, and recoverability. It shows that the system was available and operational most of the time. Security got a mean of 4.44, which was interpreted as very good in terms of confidentiality, integrity, non-repudiation, accountability and authenticity. On the Maintainability, the system got a mean of 4.52, which was interpreted as very good in terms of modularity, reusability, analyzability, modifiability and testability. It indicates that the system can be modified its modules without affecting the other. Portability got the rate of 4.26, which was interpreted as very good in terms of adaptability, Installability and replaceability.

CONCLUSIONS AND RECOMMENDATIONS

The Central Philippines State University Agri-demo farm mapping with georeferencing is a web-based application that its main goal is to develop a system that automates the process and promote the demo farms of university wide. With all the findings and gathered data, the researcher concludes that developed system was usable, efficient and secured. The developed system will contribute in the achievement of the university's goals, objectives, extension services, local government unit and future researchers.

On the evaluation result of the IT experts shows that the developed system was rated with a very good quality based on the characteristics of ISO 25010 software quality model. Further, the developed system result was useful based on the characteristics of ISO 25010 quality in use. It shows that the developed system met its stated objectives.

LIMITATIONS

This study focused on the design and development of

CPSU Agri demo farm mapping with Geoferencing for the CPSU, the extension campuses, Research and Extension Office, Local Government Unit, Office of the City/Municipal Agriculture and Agri Demo farm Clientele. The proposed web – based application will serve as an information portal for guests, students, school personnel and tourists interested in visiting demo-farms on different campuses. This study caters all demo farm sites in Central Philippines State University with its extension campuses. The system requires an internet connection to have access to it in areas.

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