(RESEARCH ARTICLE)

Improving research protocol submission management system for MMSU-IACUC

Reynaldo Jr. Quirante Salvador [1, *] and Gerry Luga Contillo [2]

[1] Department of Information Technology College of Computing and Information Sciences, Mariano Marcos State University, Batac City Philippines.
[2] Department of Computer Science, College of Computing and Information Sciences, Mariano Marcos State University, Batac City, Philippines.

Abstract

The Institutional Animal Care and Use Committee (IACUC) at Mariano Marcos State University (MMSU) faces challenges in managing research protocol submissions through a labor intensive manual process. To address this, an online research protocol submission management system was developed, leveraging Agile Methodology to ensure flexibility, collaboration, and continuous improvement. The system enhances the efficiency of the IACUC office by digitizing and automating the submission process, reducing administrative burdens, and improving the accuracy and speed of reviews. Key features include a user friendly interface for researchers, automated notifications, and a streamlined workflow for protocol evaluation and approval. User Acceptance Testing, based on ISO 25010:2011 standards, indicated high satisfaction, with a grand mean score of 4.61, demonstrating the system's effectiveness in meeting user needs. The new system significantly improves the submission process, streamlines document management, and increases overall productivity in the office, thereby supporting the IACUC's mission of ensuring ethical research practices at MMSU. By transitioning to an automated platform, the IACUC office not only enhances compliance with regulatory standards but also fosters a more efficient research environment, empowering researchers to focus on innovation and scientific inquiry. This technological advancement represents a critical step forward in modernizing administrative processes, aligning with MMSU's commitment to excellence in research management.

Keywords: Research Protocol Submission; IACUC Management System; Online Document Management; System Development

1. Introduction

An online management system is quite helpful for managing documents and other transactions. Online management systems are crucial for maintaining educational institutions, government agencies, businesses, and other organizations to be efficient and reduce labor-intensive manual document submission processes (3). They are the biggest trend on the internet, allowing users to access any paper or information online at any time and from any location.

Liden emphasizes the importance of technology management in the ICT requirements definition process, highlighting its role in facilitating efficient storage and retrieval of organizational information (5). An organization's capacity to preserve, define, store, index, update, and examine both newly created and historical organizational information is a critical function of a document management system. Document sharing, document security, and collaboration are just a few of the characteristics that a good document management system should have to do (6).

The Institutional Animal Care Unit Committee (IACUC) at Mariano Marcos State University utilizes a manual process of submission of papers and documents. The necessary papers must be personally filled out by each applicant and

* Corresponding author: Reynaldo Jr. Q. Salvador.

submitted to the university's IACUC office. The IACUC secretariat will then review the paper to ensure it is complete. Following a final assessment by the IACUC committee, copies will be delivered by the IACUC secretary to the IACUC chair for approval. The document will be returned to the IACUC secretariat, which will get in touch with the applicant to make revisions if the committee decides not to approve it. This procedure will be continued until the papers are error-free and have been approved by the IACUC committee. A second form for changes will be filled out and submitted to the secretariat. A hard copy of the document will be retained in the IACUC office for tracking and safekeeping after it has been officially approved. The current process imposes numerous challenges with the IACUC's manual process. A paper-based method increases the risk of inefficiency, slows down operations, and requires more administrative resources. The implementation of the online document submission and management system is relevant and timely for the office to provide a smooth sailing service to its constituents.

The goal of this project is to address the challenges faced by the IACUC at Mariano Marcos State University by creating a system that facilitates, implements, and manages documents online. As a project outcome, the system assists researchers in processing their paperwork without requiring them to physically visit the IACUC office.

2. Research method

The researcher opted Agile methodology as the software development methodology for the creation of the system. Agile methodology is a type of iterative and incremental software development approach that focuses on collaboration, customer feedback, and small, rapid releases. It emphasizes flexibility and continuous improvement, and allows for changes and updates throughout the development process. Agile puts a strong emphasis on interacting with users often and on a regular basis during the development process. This continuous feedback makes sure that the product changes to meet the expectations and demands of users. The key phases of Agile methodology are Requirements and Planning, Design, Development, Testing, and Deployment.

Figure 1 Agile methodology

Agile was used in the development of the system to emphasize rapid prototyping, iterative testing cycles, and high-level collaboration with stakeholders. The advantages and benefits of Agile include enhanced flexibility and adaptability during development and increased customer satisfaction due to continuous feedback and collaboration.

In the Requirements and Planning Phase, the researcher conducted a preliminary investigation to gather the data needed for developing the system. This helped in establishing the user and system requirements. A comparative analysis was conducted with selected universities to determine the functionality and gaps in similar systems. This helped in identifying the initial system modules. Data gathered from interviews allowed the researcher to identify the system requirements and outline the plan for the different modules of the system. After identifying user and system requirements, the researcher proceeded with planning and scheduling the development of the system. Moving into the Designing Phase, the researcher consulted the client (IACUC committee & researchers) regarding the system design. Feedback and suggestions were incorporated until the design meets the client's satisfaction. Transitioning to the Development Phase, the actual coding of the system took place. During this Phase, the different system features were developed and integrated into a working system. In the Testing Phase, all developed features undergo unit testing to identify any faults and ensure they meet the system and user requirements. Comprehensive testing, including black-box and white-box testing, was conducted to assess the overall system features. The system was subjected to User Acceptance Testing to determine its acceptability. Actual users tested and validated the system. The research instrument was based on ISO 25010:2011 for UAT. Lastly, in the Development Phase, this phase ensures that the system is fully functional and ready for use.

3. Results and discussions

3.1. MMSU-IACUC User Needs

A preliminary investigation was conducted to determine the current transaction and status of the MMSU-IACUC. The data collected during the preliminary investigation played a vital role in determining the implications of the study and identifying the system and user requirements.

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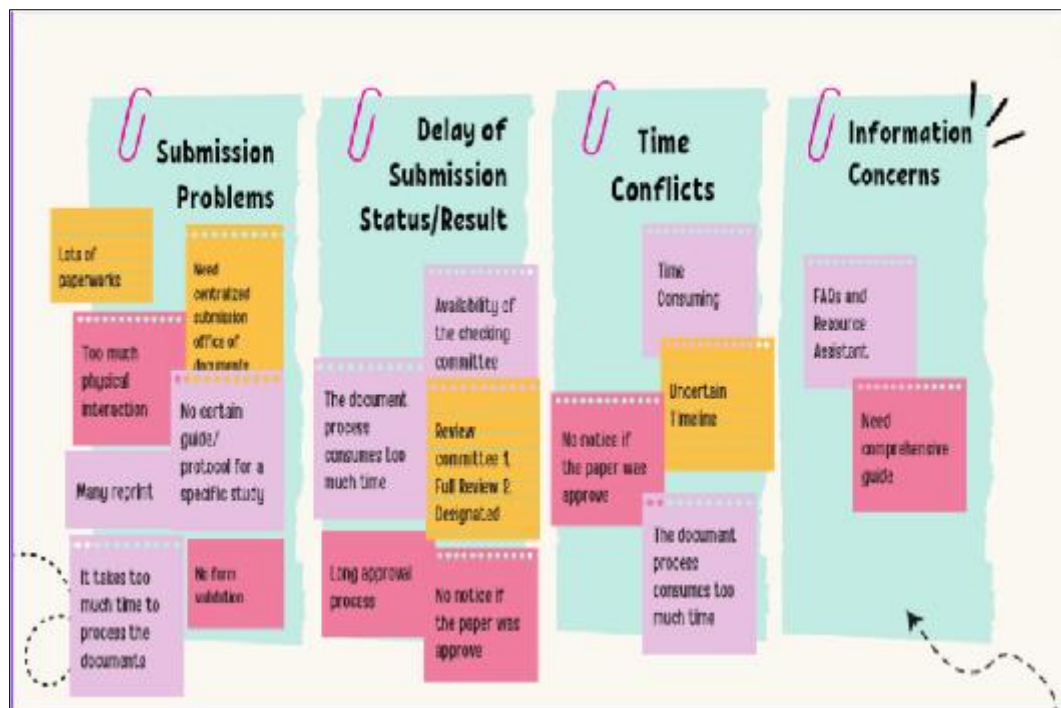

Figure 2 Need Rending Results and Proposed Solutions. (a) Representation of user needs derived from the initial interviews

The system requirements identified during the initial interview include an emphasis on the absence of form validation and centralized submission, and delay of submission status/result because of its long approval process. Participants also expressed concerns about time conflicts. The overall process is time-consuming due to the unavailability of checkers which leads to an uncertain timeline for researchers. There is also no notice if the document is ready for pickup or not. For the last problem, there is a need for a comprehensive guide on how to process documents.

3.2. Comparative Analysis Result

To further identify the different functionalities of the proposed system, the researcher carried out a comparative analysis with existing systems. This allowed the researcher to strengthen the proposed system's functionalities by considering the best practices of the existing systems. Moreover, the data gathered from the comparative analysis helped the researcher to identify gaps and lapses in the existing systems. These gaps and lapses were of great benefit in the development of the Research Protocol Submission Management System.

Table 1 Comparative Analysis Result

SYSTEM	Features				
	Protocol Submission and Review System	**FAQS**	**Features Animal Inventory and Tracking**	**Incident Reporting and Investigation**	**Automated Protocol Renewal Reminders**
University of Northern Philippines (UNP)	√	√	√	√	x
Cebu Technological University (CTU)	√	√	x	x	x
University of the Philippines Manila (UPM)	√	√	√	x	x
University of the Philippines Diliman (UPD)	√	√	√	x	x
Xavier University	√	√	√	x	x
Research Protocol Submission Management System for MMSU-IACUC	√	√	√	√	√

The researcher was able to discern several analogous systems to the research protocol submission management system for MMSU-IACUC. Specifically, the researcher identified the University of Northern Philippines, Cebu Technological University, University of the Philippines (Manila and Diliman), and Xavier University. The researcher additionally identified various factors and features that are well-suited for implementation within the system.

4. Technological Solutions

From the identified problems, the researcher proposed solutions to the problems and challenges that both IACUC committee and student researchers faced. Students can submit their studies through online submission with the use of a fillout form provided by the IACUC. Another technological solution is online checking where reviewers can access the papers of the students anytime and anywhere. Next technological solution is submission tracking that allows the student to view the current progress of their submission if it's under review, with revisions, accepted or rejected. Lastly is the assistant technological solution that assists students with their concerns and inquiries about the submission process of IACUC.
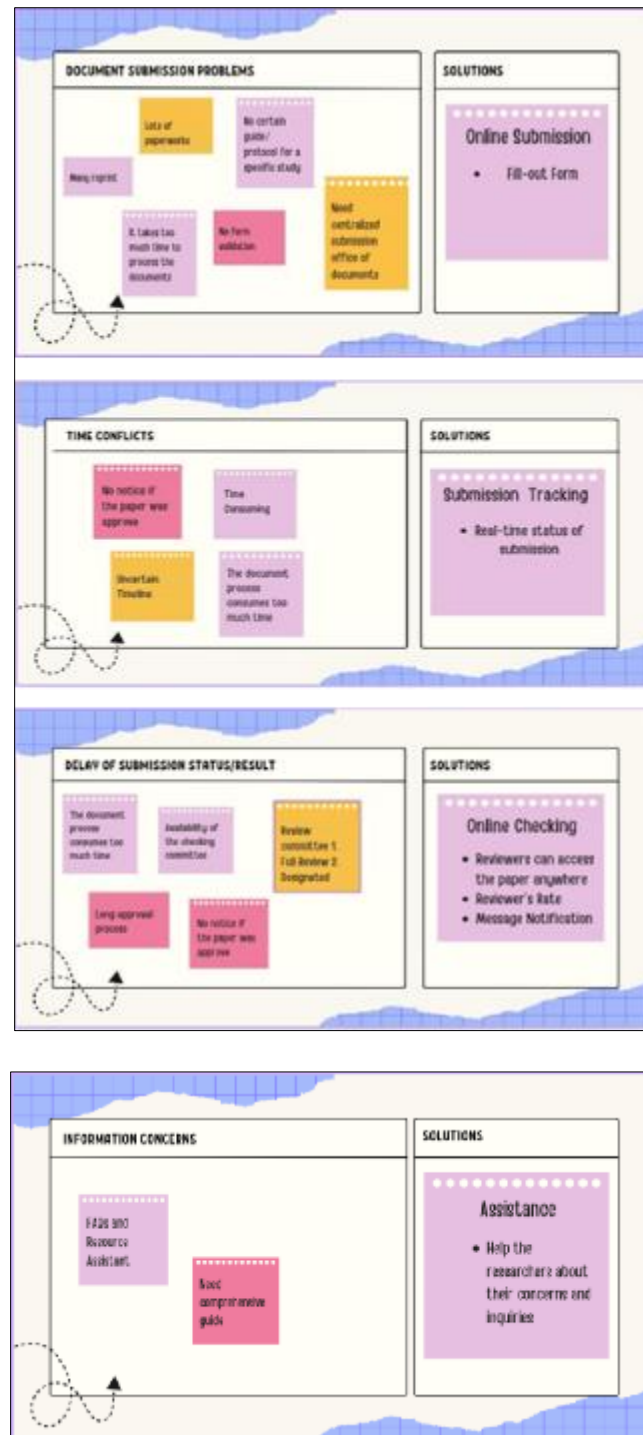
Figure 3 System functionality recommendation

5. Design Consideration and System Development

Design consideration was implemented to make sure that the system is usable, useful, valuable, accessible and desirable. The students can fill-out the form directly with input validations, can see the status of their submission through a tracking tab and can ask for questions and inquiries through the assistant chat box. The reviewers can check the submission anytime which also allows them to comment while checking. The dashboard can display the list of papers that the reviewer has to check. If the submission of the students is not checked, a message notification is automatically sent to the reviewers that serves as a reminder. The design is kept simple and ensures that both the student and reviewer can navigate on the system smoothly.
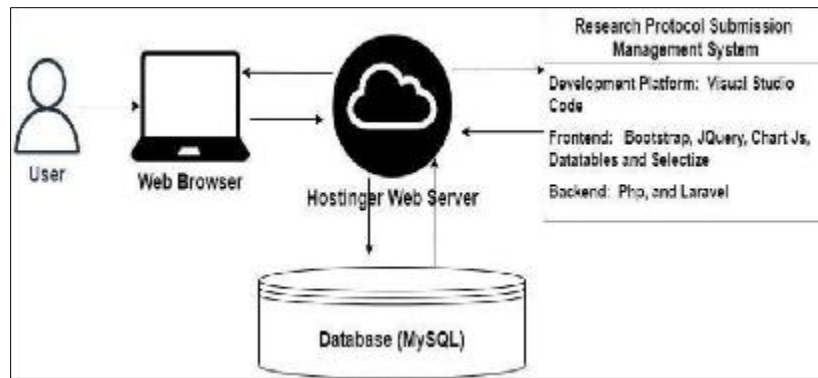
Figure 4 Development Architectural Design

The Development Architectural design showcases the various technologies utilized in developing the system. During the development phase, Visual Studio Code served as the preferred code editor and programming platform. The frontend development of the system relied on Bootstrap, Jquery, Chart JavaScript, Datatables, and Selectize. The Php and Laravel frameworks were instrumental in the back-end development, with MySQL serving as the database of choice. To facilitate the hosting of the system, the researcher procured a web server, opting for Hostinger as the web server provider.
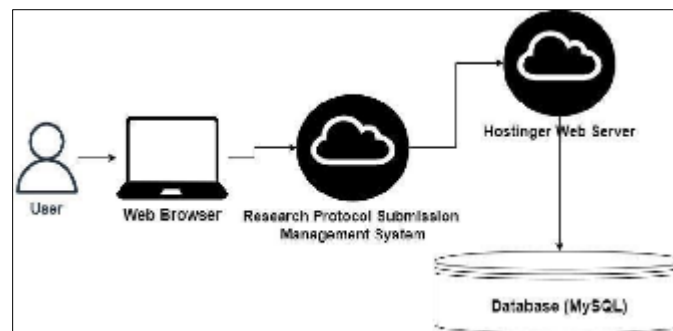

Figure 5 Deployment Architectural Design

This plan outlines the specific steps and procedures involved in launching the system and making it accessible to end-users. Hostinger is a web hosting service that provides reliable and affordable hosting solutions. MySQL is a widely used database management system that is known for its stability, security, and scalability. By utilizing Hostinger as the server and MySQL as the database management system, the deployment plan establishes a robust infrastructure that can support the system's and its users' needs.

6. User acceptance test results

Table 2 System Overall Result

Categories	Mean	Interpretation
Functionality	4.74	Strongly Agree
Reliability	4.52	Strongly Agree
Efficiency	4.56	Strongly Agree
Grand Mean	4.61	Strongly Agree

The survey aimed to assess the system's functionality, reliability, and efficiency, and the outcomes revealed that the system obtained an outstanding grand mean of 4.61. This remarkable mean score strongly implies that the participants highly agreed on the overall acceptability of the system, affirming that the system satisfies or surpasses their standards regarding its functionality, reliability, and efficiency.

7. Conclusion

The IACUC Protocol Submission Management System successfully addresses the challenges faced by the IACUC office in managing protocol submissions. The system enhances the efficiency, accuracy, and productivity of the office by updating the submission process, reducing errors, and automating repetitive tasks. The high level of user acceptance indicates that the system is user-friendly and meets the expectations of the intended users, including researchers and the IACUC committee.

Recommendations

After conducting a thorough analysis of the study, several recommendations are identified for enhancing the system

- Addition of request function - It is recommended to include a request function within the system, which would allow IACUC checkers to request physical copies of protocols under review.
- Incorporation of checked study payment computation - The system should include a feature that will track the checked study of all checkers for the computation of their honorarium. 3. Implementation of an Edit Review Functionality - The system should feature an edit review functionality that allows reviewers to make track changes directly within the digital platform.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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