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# Design and Development of RDI Monitoring System of RSU's Funded Research Projects †

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**Abstract**

This paper presents the design, development, and evaluation of the REDI Monitoring System, a web-based platform aimed at enhancing the management and monitoring of funded research projects at Romblon State University (RSU). The system provides streamlined functionalities for proposal creation, submission, collaborator management, and administrative oversight, tailored to the needs of both students and faculty members. The development process adhered to established software engineering standards to ensure robustness and usability. A comprehensive testing phase was conducted with 50 participants, including students and faculty, following the ISO/IEC/IEEE 29119 software testing framework. Results demonstrated high user satisfaction, with over 90% of participants finding the system user-friendly and reliable. Minor areas for improvement were identified in notification delivery and interface responsiveness for faculty users. The REDI Monitoring System presents an effective and efficient solution that supports RSU's research administration processes, fostering greater collaboration and transparency in funded research activities.

**Keywords:** Agile Development; Document Monitoring; Laravel Framework; MySQL Server; Online Submission; System Development Life Cycle



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## 1. Introduction

Information systems play a critical role in today's digital environment. Research has shown that digitized processes lead to faster operations, increased productivity, improved monitoring, and greater accuracy and consistency of information [1]. Automation, defined as the use of technology to perform tasks traditionally carried out by humans at greater speed and continuity, has become a cornerstone of digital transformation [2]. Furthermore, many organizations are now investing in information systems that enable the integration and sharing of knowledge [3].

However, despite these technological advancements, some institutions still rely on manual methods for storing and retrieving data. This reliance negatively affects productivity, efficiency, and the accuracy of information, ultimately compromising service quality. According to Keating (2016) [4], traditional data storage methods face four major challenges, namely slow data acquisition, high maintenance costs, limited scalability, and significant resources, leading to delays throughout the submission and review of research proposals,

increased administrative workload, redundant submissions, and difficulty in keeping up with the growing volume of proposals.

To address these challenges, a digital monitoring system for RSU's funded research initiatives is proposed. This system will serve as an efficient platform for tracking and managing research activities and scholarly outputs. By implementing this system, all university campuses can benefit from a more streamlined, cost-effective process for academic communication. An online submission and monitoring system will significantly enhance service delivery by meeting the diverse information needs of researchers, faculty, officers, and students.

## 2. Objectives

The Monitoring System for RSU's Funded Research is a web-based platform developed to enhance the management and oversight of academic research activities within Romblon State University. Its primary objective is to provide a digital solution that automates and streamlines the entire process of research proposal handling—from the creation and submission of proposals by researchers to the review, feedback, and approval stages managed by the monitoring office. By shifting from manual procedures to an online system, the university aims to improve efficiency, reduce administrative workload, and ensure timely processing of research-related documentation.

The system supports three main user roles, namely researchers, admins, and a super admin. Researchers include faculty, staff, and students who submit proposals for evaluation. Admins are members of the REDI office responsible for evaluating these submissions. They can provide comments, approve, or reject proposals as part of the review process. Each user is required to register in the system, submitting a valid university ID to verify their identity. Since admins serve as key evaluators in the process, their registration must be reviewed and approved by the super admin to ensure that only authorized personnel are granted access to sensitive functions.

To enhance communication and ensure accountability, the system incorporates an automated email notification feature. This tool notifies users of important actions such as registration confirmation, proposal status updates, and feedback from evaluators. Overall, the system not only simplifies the submission and approval workflow but also provides a more secure, reliable, and transparent method for managing RSU's funded research initiatives.

## 3. Materials and Methods

### *3.1. Methodology*

The researcher applied the system development life cycle (SDLC) as the primary methodology to strategically guide and structure the development process of the monitoring system [5]. SDLC offers a systematic approach to software development, ensuring that each phase of the project—from planning to deployment—is well-defined and executed with clear objectives. Among the various frameworks available under SDLC, the researcher selected the waterfall model to best align with the standards and goals of this study.

The waterfall model was deemed suitable because of its linear and organized structure, which supports a straightforward implementation process for new software projects [6]. It allows for a clear division of work into sequential phases, making it easier to manage progress and evaluate the outcomes at each stage. Although slight variations may exist in how developers describe the phases or how many steps are included, the core principles of the waterfall model remain consistent—moving from requirements gathering to design, implementation, testing, deployment, and maintenance.

This model's step-by-step nature ensures that each development activity is completed before moving on to the next, promoting clarity and reducing the risk of overlapping

tasks or rework. As emphasized by Ruparelia (2010) [7], the waterfall approach follows a sequential progression, where every phase is treated as a distinct process with specific deliverables. This structure made it ideal for the development of a well-defined, functional, and user-centered application like the RSU Funded Research Monitoring System.

### *3.2. Tools and Technology for Development*

#### 3.2.1. Hardware Requirements

The minimum hardware requirements for implementing the system include computer units equipped with at least 2 GB of RAM, 1 GB of available hard disk space, and a processor equivalent to Intel Celeron or later. These specifications are sufficient for users to access and interact with the system effectively.

In contrast, the hardware setup used during the system development phase required more advanced specifications to support programming, testing, and database management tasks. The development environment was configured with 8 GB of RAM, a 1TB hard disk drive, and an Intel Core i5 processor. These higher specifications ensured smooth performance during software development, including running local servers and managing large sets of data.

#### 3.2.2. Software Requirements

The software minimum requirements needed are an operating system (Windows 7 or later), Adobe XD 2020 30.1.12.4, Visual Studio Code 1.59.1, Xampp 3.2.2, Google Chrome 95.0.4638.54, Mysql (MariaDB 10.1.37), Git Bash 2.31.0, Node JS 6.14.13, and PHP 8.0.9. For modules, frameworks, and components, Laravel Framework 8.9, Javascript, Jquery, and CSS were used.

### *3.3. System Requirements*

The minimum software requirements for running and maintaining the system include a compatible operating system (Windows 7 or later) and a set of essential development and runtime tools. These include Adobe XD 2020 (version 30.1.12.4) for interface design, Visual Studio Code (version 1.59.1) as the code editor, and XAMPP (version 3.2.2) for managing the local development environment. The system also requires Google Chrome (version 95.0.4638.54) for browser-based testing, MySQL (MariaDB 10.1.37) for database management, Git Bash (version 2.31.0) for version control, Node.js (version 6.14.13) for JavaScript runtime, and PHP (version 8.0.9) for backend scripting.

In terms of modules, frameworks, and components, the system is built using the Laravel Framework (version 8.9) for backend development. It also incorporates JavaScript, jQuery, and CSS to manage frontend interactivity and styling. Together, these tools and technologies form the complete stack necessary for the development, deployment, and operation of the monitoring system.

#### 3.3.1. Researchers

Researchers, composed of faculty and students of the university, are required to submit research proposals for funding. Registered researchers have access to the following functions:

- A user homepage displaying participant details, proposal statistics, and a summary of proposals created;
- A user profile page allowing for updates and modifications of personal information, including email and password changes;
- A proposal list showing proposals created by the researcher, sorted by creation date and current status;

- The ability to create and submit new proposals to the admin;
- View proposals they have created;
- Add collaborators to their proposals;
- Receive notifications on proposal updates from coordinators, such as approval, rejection, or comments;
- Cancel proposal submissions within 24 h of submission (or within a specified duration).

#### 3.3.2. Admin

Admins are academic personnel responsible for receiving, reviewing, and responding to proposals submitted by researchers. Their capabilities include

- A user homepage with coordinator details, proposal statistics, and the number of proposals received;
- A user profile page to update personal information, including the email and password;
- A proposal list of submissions received, sorted by date received with status displayed;
- Notifications when proposals are received;
- View proposals received;
- Approve or reject proposals, with the ability to provide reasons for rejection and record response dates;
- Comment on and reply to proposals;
- Generate submission reports for researchers.

#### 3.3.3. Super Admin

The super admin is responsible for the overall management of the REDI Monitoring System. Their administrative rights include

- Viewing system usage statistics;
- Approving admin registrations;
- Removing users from the system;
- Modifying system settings.

## 4. Result and Discussion

### *4.1. REDI Monitoring System*

The Proposal Submission System categorizes users into three groups, namely researchers, admins, and super admins.

Researchers are provided with features for profile management (Figure 1), adding collaborators (Figure 2), and proposal submission (Figure 3). This setup reflects the researchers' primary role in submitting proposals and awaiting coordinator feedback.

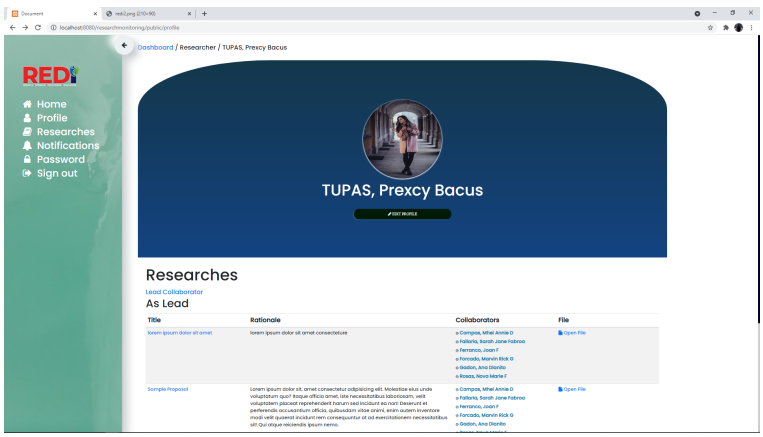


**Figure 1.** Researcher's profile.

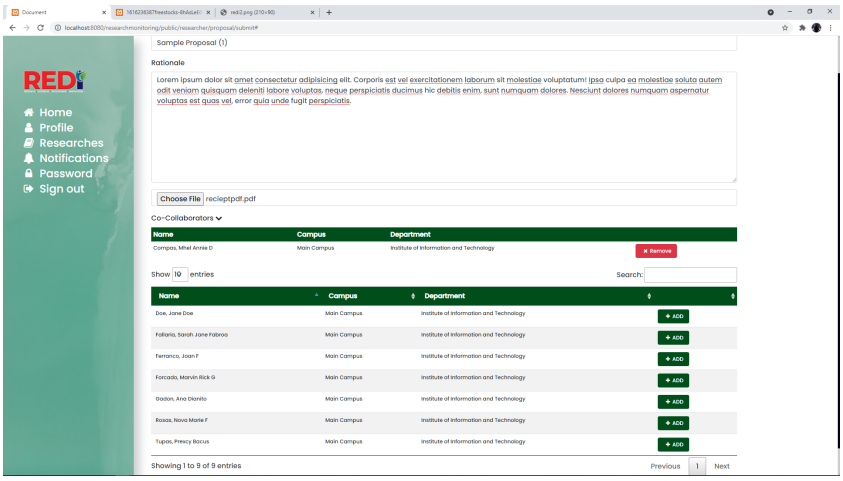


**Figure 2.** Adding collaborator module.

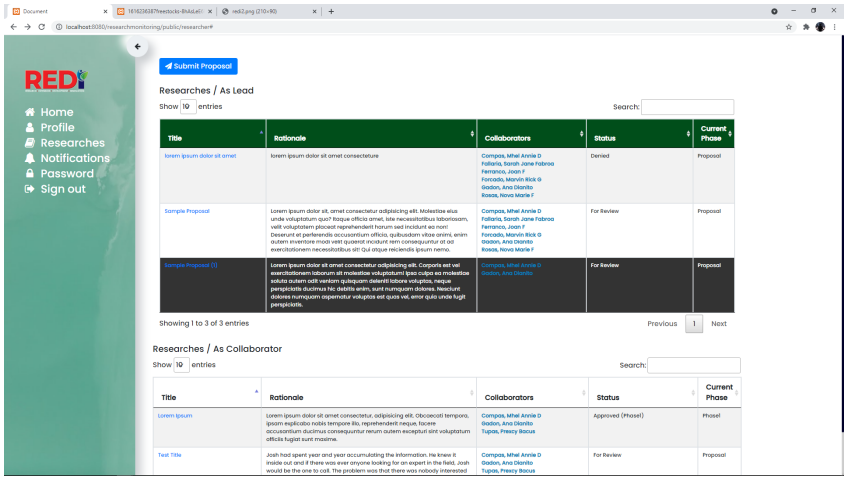


**Figure 3.** Proposal submission.

Admins are involved in responses to proposal submissions, either approving, rejecting, or commenting (Figures 4–6) on the proposal received. Also, its main function is to monitor research proposals per phase and level (Figure 7).

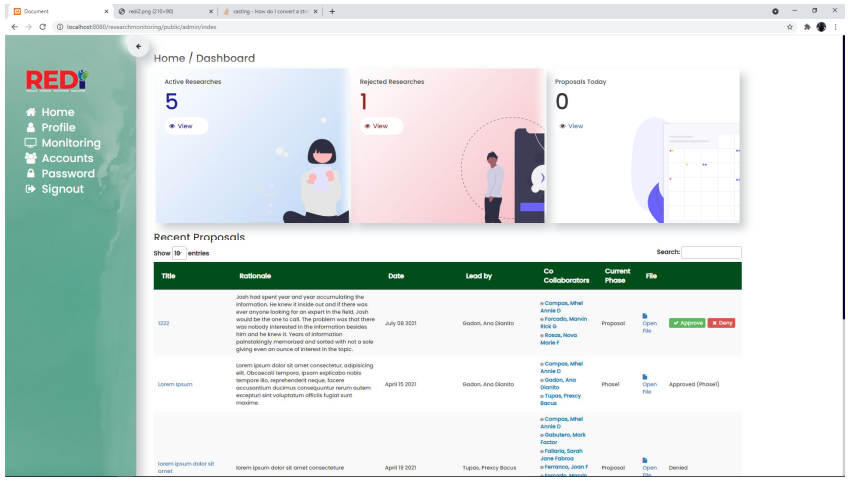


**Figure 4.** Admin proposal dashboard.

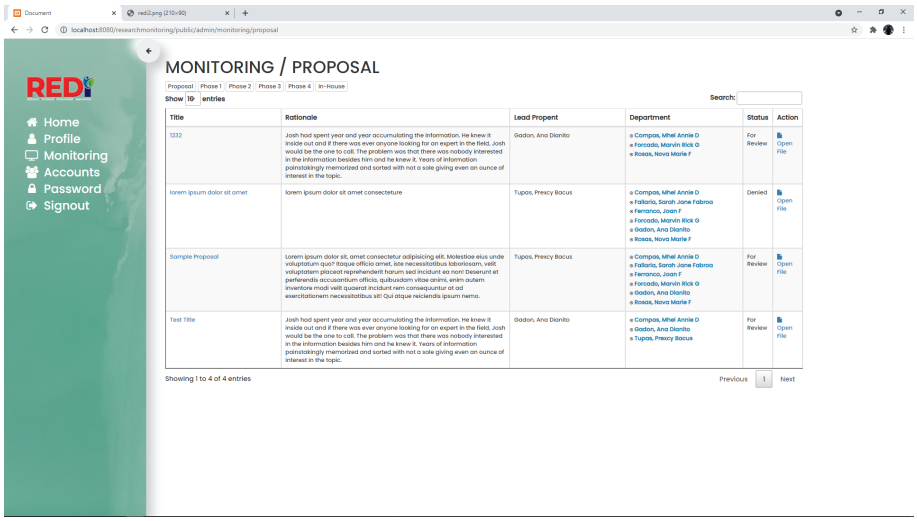


**Figure 5.** List of proposals.

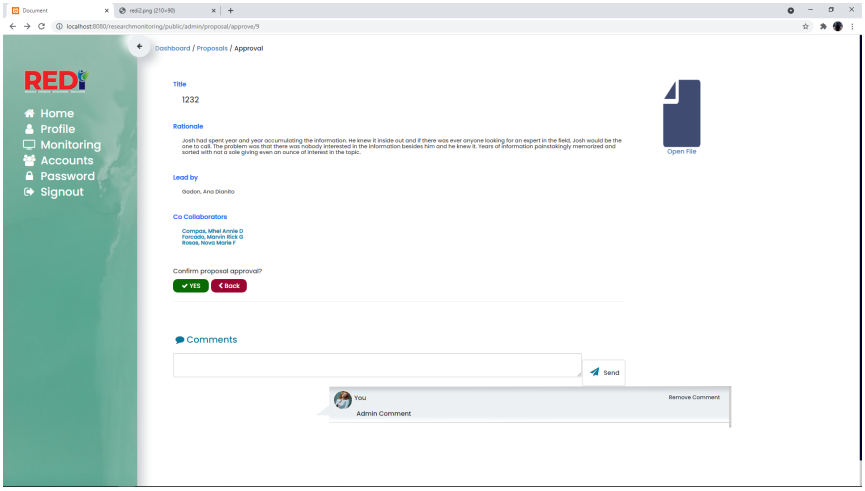


**Figure 6.** Approval and comment section.

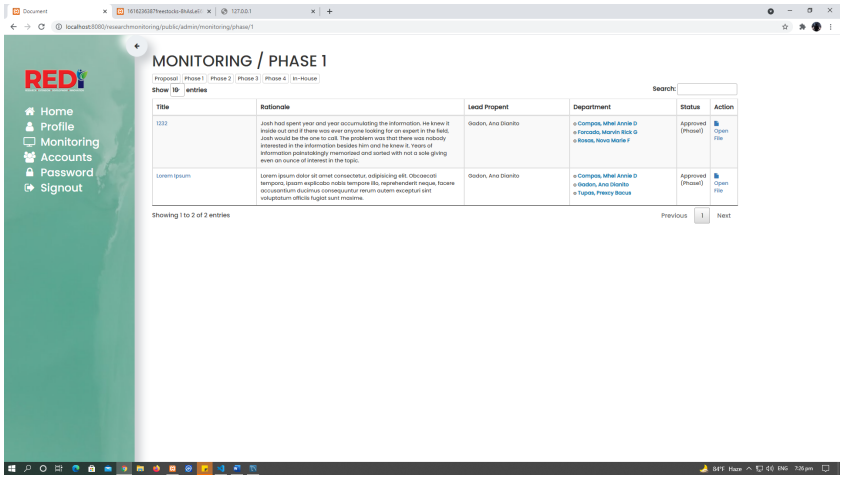


**Figure 7.** Admin monitoring module.

The super admin is not directly involved in the system as a user; they are responsible for managing the system. They are responsible for the approval of admin registration, removing or adding users from the system, and modifying system settings (Figure 8).

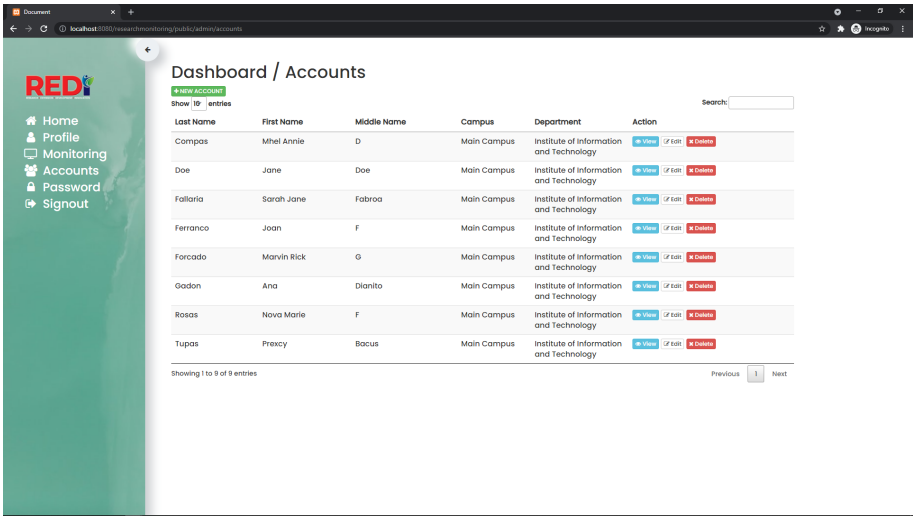


**Figure 8.** Super admin module.

### *4.2. System Features*

The REDI Monitoring System incorporates several additional features beyond the basic system requirements to enhance the academic proposal submission and approval process.

The proposal template feature allows admins to design formats or templates for submitting proposals, including specifying the necessary requirements with brief descriptions. By default, the system provides a summarized proposal format. Through this feature, admins can customize proposal requirements to suit different research purposes. Both admins and researchers can access and review all the templates available in the system. The creation of a proposal marks the initial step in the approval workflow. Another key feature is the implementation of proposal forwarding and submission evaluation, which includes the option to add collaborators to each research project. This functionality enables admins to notify collaborators and share proposal evaluations. Proposal forwarding requires the lead proponent (researcher) to define various permissions, such as granting collaborators access rights to view the proposal evaluation.

The system offers a guided, step-by-step form for proposal creation to help researchers smoothly prepare their submissions. An optional file attachment field is also available, allowing users to upload supporting documents alongside their proposals. Once all steps are completed, the proposal is submitted to a selected recipient from the list of registered admins. After submission, the researcher can view the proposal in their profile, where it appears with a pending status under their list of proposals. Admins receive notifications about the new proposal submission, and their user profiles are updated to show the proposals they have received. Researchers can review the submitted proposal, download any attached files, or cancel the submission if performed within 24 h (or a time frame set by the system administrator). Coordinators can access the proposal with additional options to comment, approve, or reject it.

## 5. Testing

The testing phase of the REDI Monitoring System adhered to the ISO/IEC/IEEE 29119 Software Testing standard, which defines a structured and systematic approach to ensure software quality and effectiveness. This approach includes test planning, design, execution, and evaluation to guarantee that the system meets its specified requirements.

### 5.1. Participant Demographics

Testing involved a total of 50 participants from Romblon State University, selected to represent the system's end-users:

- Students: 30 participants, including undergraduate and graduate students actively engaged in academic research and proposal submission.
- Faculty Members: 20 participants, comprising instructors and administrative staff involved in research coordination and evaluation.

These participants actively interacted with the system over a two-week testing period.

### 5.2. Testing Process

A comprehensive test plan was developed based on the system requirements, clearly outlining the scope, objectives, resources, and schedule for the testing activities. This plan adhered to the guidelines set forth in ISO/IEC/IEEE 29119 to ensure thorough coverage of both functional and non-functional aspects of the REDI Monitoring System. Following the planning phase, detailed test cases were designed to address all critical features of the system. These included user registration and authentication, proposal creation, submission, and cancelation, management of proposal templates, forwarding proposals and managing collaborators, delivery of notifications, and administrative functions such as approval, rejection, and system settings management for both admin and super admin users. The test cases were executed by participants within a controlled environment, combining functional testing—which verified that all operations worked correctly—with usability testing to assess the user experience. Any defects or issues encountered during this phase were carefully documented for subsequent resolution. Upon completion of testing, the results were thoroughly analyzed and reported. The system's performance was measured against predefined acceptance criteria to determine its readiness for deployment.

### 5.3. Test Result

The testing phase of the REDI Monitoring System involved 30 students and 20 faculty members from Romblon State University (Table 1). Among the students, 93% found the proposal submission process straightforward, while 90% reported that the system interface was user-friendly. Collaborator management was appreciated by 87% of student users. Faculty members showed slightly lower but still positive ratings, with 88% finding submission easy and 85% satisfied with the interface usability. Notification timeliness issues were more prominent among faculty, with 25% reporting minor delays compared to only 10% of students. Regarding system reliability, 95% of students experienced no downtime, whereas 85% of faculty reported stable performance. Interface responsiveness was rated highly by both groups, with 92% of students and 80% of faculty satisfied. Overall satisfaction was strong across demographics, averaging 90%, indicating that the system effectively supports the needs of its diverse user base while highlighting areas for improvement, particularly in notification delivery and interface responsiveness for faculty users.

**Table 1.** Summary of testing results by user demographics.

| Test Aspect | Students (30 Participants) | Faculty (20 Participants) |
|---|---|---|
| Proposal Submission Ease | 93% | 88% |
| Interface Usability | 90% | 85% |
| Collaborator Management | 87% | 80% |
| Notification Timeliness Issues | 10% | 25% |
| System Reliability (No Downtime) | 95% | 85% |
| Interface Responsiveness | 92% | 80% |
| Overall Satisfaction | 91% | 88% |

## 6. Summary, Conclusions, and Recommendations

The REDI Monitoring System was developed to enhance the management and monitoring of funded research projects at Romblon State University by providing essential features such as proposal creation and submission, collaborator management, notifications, and administrative controls tailored to different user roles.

The system underwent rigorous testing in line with ISO/IEC/IEEE 29119 standards, involving 50 participants from both the student and faculty populations. Results showed that the system effectively meets user needs, with high satisfaction reported in terms of usability, proposal submission, and reliability. While students generally expressed slightly higher satisfaction levels, faculty members noted minor issues related to notification delays and interface responsiveness. Addressing these concerns will improve the overall user experience and system performance.

Therefore, it is recommended that efforts be focused on optimizing notification delivery to ensure timely updates, enhancing interface responsiveness, and establishing ongoing user feedback mechanisms to promptly identify and resolve future issues. Additionally, conducting scalability testing and providing adequate training and support will further strengthen the system's capacity to support Romblon State University's research administration effectively. These improvements will help ensure that the REDI Monitoring System remains a reliable, user-friendly tool that fosters collaboration and transparency in managing funded research projects.

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