

E-Ligtas: “A Reporting System for Child at Risk Cases for the MSWDO in Bani, Pangasinan”

Gemma Rose L. Taipan, Ruissan A. Ramos, Dane Josef B. Ramos, Mary Joy B. Erum, Jovy L. Castañeda

Pangasinan State University

DOI : <https://doi.org/10.51583/IJLTEMAS.2025.1401020>

Received: 30 January 2025; Accepted: 01 February 2025; Published: 15 February 2025

Abstract – Child protection and well-being are subjects close to the heart of many communities across the globe, with awareness of abuse, neglect, and rape cases on the rise. In Bani, Pangasinan, child protection remains challenging for the Municipal Social Welfare and Development Office (MSWDO), primarily due to personnel constraints and the manual paper-based reporting process. This paper describes the design and development of E-Ligtas: A Reporting System for Child at Risk Cases for the MSWDO in Bani, Pangasinan, to help the MSWDO staff in gathering reports efficiently. The system features Case Reporting, a Case Status Tracker, a Homepage for Information Dissemination, and Case Tally by Barangay, improving accuracy in data and response time. This research used developmental and descriptive strategy, including system usability testing through a survey questionnaire distributed to MSWDO personnel. Using a web-based platform and mobile-responsive reporting would enhance the efficiency and effectiveness of child protection processes, reducing manual methods. E-Ligtas can also be an effective tool, which the MSWDO can use to improve child protection and might inspire others in other regions to follow.

Keywords: abuse, neglect, rape cases, MSWDO

I. Introduction

In the past few years, international attention has been drawn to the importance of child protection and welfare ^[1]. This has been driven by alarming statistics, which include growing recognition of the frequency of abuse, neglect, and rape cases of children ^[10]. Child protection involves efforts to shield children from different forms of harm, such as abuse, exploitation, and neglect ^[10]. Conversely, child welfare focuses on enhancing children's well-being and addressing their physical, emotional, and social needs to foster safe environments that support their overall health and happiness ^[2]. Hence, this calls for the establishment of extensive reporting mechanisms for child protection and welfare.

Studies prove that a multi-faceted approach to child protection should be adopted, emphasizing prevention, immediate assistance to victims, and an effective reporting system whereby the exploitation risk could be decreased ^[10]. An operational reporting system provides many benefits: these include analysis of data efficiently, early detection of child exploitation cases and protection intervention, ease of access to support services, cooperation among stakeholders, and increased accountability within the child protection system ^[10].

However, the risks and limitations of conventional reporting, including paper-based documentation and manual data recordings, are still evident ^[4]. On the other hand, computerized reporting systems are maximized for data collection and analysis, thus providing effectiveness and efficiency in keeping children safe ^[5]. Therefore, the Municipal Social and Welfare Development in Bani, Pangasinan, is confronted by the imperative need to modernize in light of the shortcomings of these traditional methods.

In response to the challenges faced by the Municipal Social Welfare and Development Office (MSWDO) of Bani, Pangasinan, this study presents E-Ligtas: A Reporting System for Child at Risk Cases. The department's traditional reporting system, which is run by a small team of 15 employees, can typically handle only five cases per day. Due to this constraint, incident management is slow and inefficient, as the demand for modern case management continues to rise. With the addition of Firebase as a real-time database, the E-Ligtas system simplifies the process by creating an online portal that can report child-at-risk cases to organizations. This will help strengthen the operations of MSWDO, so that response times are quick, and the results are more efficient. Here are the primary features of E-Ligtas:

Case Reporting. The system allows people to report incidences of abuse, neglect, or rape cases online. Reports could contain elaborate details and multimedia evidence such as pictures to aid the evaluation process. Firebase secures data safely and facilitates its access by authorized personnel in real-time.

Case Status Tracker. This feature enables users to keep track of the progress of reported cases. Updates such as "Under Review," "In Progress," and "Completed" will be automatically synced to Firebase, ensuring transparency without requiring manual follow-ups.

Homepage for Information Dissemination. A system with a common homepage for disseminating announcements, educational materials, and updates regarding child welfare programs will be incorporated. This allows awareness and engagement of the users, as well as being a portal to critical information.

Case Tally by Barangay. E-Ligtas allows for the tallying and displaying of cases by barangay for data-driven decision-making.

Such data visualization is useful in determining which areas require more attention, thereby allowing for the proper distribution of resources from the MSWD.

Using Firebase, E-Ligtas guarantees that all data is synchronized, current, and secure, especially when dealing with sensitive information. The shift to a digital system improves the reporting process, making it more accessible, transparent, and efficient for both residents and staff. With E-Ligtas, the MSWD can strengthen its ability to protect vulnerable children. This system not only tackles the immediate challenges faced by the MSWD in Bani, Pangasinan but also acts as a scalable model for other municipalities aiming to modernize their child protection efforts.

II. Methodology

The Modified Waterfall Development Methodology was used in this study to develop an efficient and organized system^[6]. This approach was structured and phase-based, yet it offered the flexibility to adapt to changes and integrate feedback at every stage. It focuses on comprehensive planning and documentation to guarantee a clear understanding of the project's requirements from the beginning. The methodology consisted of several key phases: Requirements Gathering and Analysis, System Design, Implementation, Integration and Testing, and Deployment^[6].

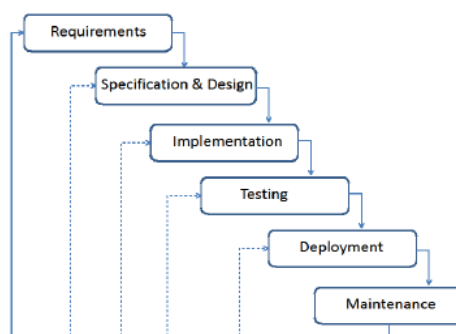


Fig. 1: Modified Waterfall Model

In this initial phase, proponents evaluated potential risks and prioritized the different functions of the system^[7]. This essential phase will include collecting and documenting user requirements, assessing their feasibility, and establishing their significance to the overall system goals. Identifying potential risks early in the development process ensured that systemic functions were prioritized by the team. Subsequently, an efficient system was developed, through which a solution will be delivered to meet stakeholder needs.

During the design phase, a complete review of requirement specification documents laid the structure of the architecture of the system, its components, modules, interfaces, and data^[7]. The team also considered building prototypes to check crucial functionalities concerning stakeholder expectations before the final specification was developed.

During the implementation phase, carefully select the right technologies to guarantee the system's scalability, performance, and compatibility^[7]. E-Ligtas was built using React.js, a component-based JavaScript library that promoted modularity and responsiveness, providing a smooth user experience. For styling, we opted for Tailwind CSS because of its utility-first approach, which simplified and accelerated UI design. The system leveraged Firebase Realtime Database, a cloud-based NoSQL database that allowed for real-time synchronization of case reports and updates, ensuring that data was instantly reflected across all user roles. Visual Studio Code was chosen as our primary development environment due to its robust support for debugging and extensions, which boosted productivity.

The system was subjected to extensive testing to guarantee it ran smoothly^[7]. This was the stage where stakeholders tested the functionality and interface, providing feedback. Any identified issues were resolved to ensure the reliable deployment of the software. After the testing phase was completed, the system was implemented for end users.

The deployment closely observed that each component was configured correctly^[7]. Stakeholder or end-user feedback was incorporated to make necessary changes to meet the system's expectations and requirements.

By utilizing the Modified Waterfall Development Methodology, the project achieved a well-organized and dependable system that fulfilled the established goals and stakeholder needs. This method promoted systematic advancement and efficient risk management, playing a key role in the project's overall success. As part of the development process, various tools were utilized to improve clarity and organization, facilitating effective communication and a seamless workflow throughout the project.

Flowchart. One of the essential tools utilized was the flowchart, which played a vital role in organizing and illustrating the step-by-step processes of the system^[13]. It helped visualize the workflow, ensuring that tasks were completed in a logical sequence, and provided a clear guide for both developers and stakeholders.

ERD (Entity-Relationship Diagram). To ensure that the database structure was well-organized and efficient, an ERD was developed. This tool visually represented the entities and their relationships within the database, aiding the development team in understanding how data was interconnected and ensuring data integrity.

Database Schema. Complementing the ERD, the database schema detailed the structure of the database, defining tables, fields, and data types. This helped the team ensure that the system could store and retrieve data efficiently while maintaining security and integrity, which is particularly crucial for managing sensitive case information.

Weighted Mean. To evaluate the system's effectiveness, the proponents employed the weighted mean to calculate the average responses from the survey regarding the reporting of children's well-being^[8]. This statistical tool offered insights into how the system was perceived by respondents and guided decisions on necessary improvements.

E-Scale of Measurement. The e-scale of measurement was utilized to assess the level of acceptance of the proposed system. It provided a quantitative understanding of how well the system met user expectations, allowing for adjustments to enhance user satisfaction. The rating is shown in the Table 1:

Table I: Scale of Measurement

Scale	Statistical Limits	Rating
1	1.00 – 1.81	Poor
2	1.81 – 2.60	Fair
3	2.60 – 3.41	Good
4	3.41 – 4.20	Very Good
5	4.21 – 5.00	Excellent

This scale was specifically created to assess how well the system is accepted, allowing for necessary adjustments to be made based on user feedback.

The study took place in Bani, Pangasinan, where data was collected through interviews to evaluate the reporting process, identify challenges, and determine areas for improvement. The study involves the officer-in-charge, MSWDO staff, IT experts, and the residents, each providing important insights into the reporting process. The distribution of the respondents is as follows:

Table II: Respondents

Respondents	Number of Respondents
Officer-in-Charge	1
MSWDO Staff	15
IT Expert	2
Residents	38
Total	56

III. Result and Discussion

E-Ligtas improved the reporting process for residents and staff. The system allowed staff to effectively monitor and handle reports without the burden of sifting through stacks of paperwork. For users or residents who were reluctant to report incidents in person, the platform provided a more convenient and secure method to express their concerns at their own pace. The platform received an average weighted mean score of 4.28, which is categorized as "Excellent." This rating underscores the system's reliability, ease of use, adaptability, and security, demonstrating its effectiveness in managing cases involving children at risk. Users reported that the system is trustworthy and meets their needs well, leading to a favorable overall assessment. The following discussion outlined the architecture of E-Ligtas: A Reporting System for Child at Risk Cases for the MSWDO in Bani, Pangasinan.

System Architecture of E-Ligtas

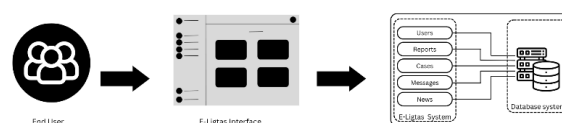


Fig. 2: E-Ligtas Three-Tier Architecture

The three-tier architecture was the organization of software applications into three logical and physical computing tiers, which included the presentation (user interface), the application (data processing), and the data tier (management of data) ^[9].

The E-Ligtas system was built on a three-tier architecture, providing efficient and secure reporting and management of child-at-risk cases. Accessible through web browsers and mobile applications, the user interface was located at the presentation tier. The interface enabled users, including those who are concerned or social workers, to submit reports, track the progress of cases, and receive real-time messages to interact with designated MSWDO personnel ^[12]. The user interface was designed to be easy to navigate and interact with, utilizing React.js and Tailwind CSS for optimal responsiveness. Moreover, this tier involved role-based access, which means that reporters, admins (staff), and super admin (Officer-in-Charge) also have the privilege of carrying out their assigned duties ^[9].

E-Ligtas handled the business logic needed to handle child welfare cases efficiently at the application tier. Unlike the usual user registration process, the system provided both anonymity and confidentiality by automatically creating a unique transaction ID for each report submitted. This transaction ID empowered reporters to stay informed about their case's progress without revealing personal information while also maintaining their privacy and safety. It also facilitated report assignment, where the officer-in-charge assigned cases to the appropriate staff according to barangay location or case urgency. It also included automated priority so that critical cases were flagged for immediate attention ^[9].

At the data tier, E-Ligtas was tasked with securely storing and managing case reports, system records, and administrative data. By using Firebase Realtime Database, the system provides efficient data storage and allows for real-time synchronization across various devices ^[9]. This tier was built to uphold data integrity and security, ensuring that only authorized personnel, such as super admins and admins, had access to and could manage case-related information. Although the system did not allow reporters to retrieve data, it guaranteed that case details were securely stored for monitoring and future references by authorized users. The data tier also supported exporting through a downloadable intake sheet feature, enabling admins to create Excel or PDF files for record-keeping, documentation, and backup purposes. This capability assisted the Municipal Social Welfare and Development (MSWD) personnel in maintaining both physical and digital archives for compliance and review. Furthermore, by employing a scalable database structure, E-Ligtas is well-equipped for future enhancements, ensuring it could adapt as new features and reporting requirements arise. This tier was essential in supporting child protection efforts by facilitating accurate record management and secure case handling.

The three-tier architecture of the system offered a structured, secure, and effective system for reporting cases involving children at risk. The presentation tier focused on accessibility and user-friendliness, the application tier managed intricate business logic and facilitated real-time communication, while the data tier provided well-organized and secure storage for case reports. This setup ensured that child welfare cases were handled swiftly, reducing delays and improving the efficiency of the MSWDO's case management process.

V. Conclusion

The development of E-Ligtas: A Reporting System for Child at Risk Cases for the MSWDO in Bani, Pangasinan represented a major step forward in improving child protection and welfare services in the area. The system responded to the urgent need to update outdated methods that were cumbersome and inefficient. With features like case reporting, a case status tracker, an information dissemination homepage, a tally of cases per barangay, and mobile accessibility, E-Ligtas greatly enhanced the accuracy and speed of data management, thus increasing the overall efficiency and effectiveness of the Municipal Social Welfare and Development Office (MSWDO). The implemented system was built on a strong three-tier architecture, allowing each layer—presentation, application, and data—to be developed, upgraded, and scaled independently as necessary. This design fostered a resilient and adaptable system that can respond to changing needs. Usability testing and feedback from MSWD personnel and community members highlight the system's acceptability and its potential to enhance child safety and welfare.

Reference

1. P. Welbourne and J. Dixon, "Child protection and welfare: cultures, policies, and practices," *European Journal of Social Work*, 2023.
2. Britannica, "child welfare," [Online]. Available: <https://www.britannica.com/topic/child-abuse>. [Accessed 2024].
3. J. Dantoni, "Operational Reporting: Types, Examples, and Best Practices," 2022. [Online]. Available: <https://www.netsuite.com/portal/resource/articles/data-warehouse/operational-reporting.shtml>. [Accessed 2024].
4. E. Lavelle, "Manual process vs automated process: Which is better?," 2021. [Online]. Available: <https://www.enable.com/blog/manual-process-vs-automated-process-which-is-better>. [Accessed 2024].
5. E. Gustafsson-Wright, S. Osborne and M. Aggarwal, "DIGITAL TOOLS FOR REAL-TIME DATA COLLECTION IN EDUCATION," 2022. [Online]. Available: <https://www.brookings.edu/articles/digital-tools-for-real-time-data-collection-in-education/>. [Accessed 2023].
6. Prashant, "Modified Waterfall in Software Engineering| Modified Waterfall," [Online]. Available: <https://radhikaclases.com/waterfall-model-in-software-engineering/>. [Accessed 2024].
7. actiTIME, "Waterfall Model: What Is It, When and How to Use It?," 2022. [Online]. Available: <https://www.actitime.com/project-management/what-is-waterfall-model>. [Accessed 2024].

8. BYJU'S, "Weighted Mean Formula," [Online]. Available: <https://byjus.com/weighted-mean-formula/>. [Accessed 2024].
9. IBM, "What is three-tier architecture?" [Online]. Available: <https://www.ibm.com/think/topics/three-tier-architecture>. [Accessed 2024].
10. UNICEF, "Child protection overview," UNICEF, 2022.
11. riskonnect, "What is Incident Reporting and Why Is It Important?," 2024. [Online]. Available: <https://riskonnect.com/health-safety-management/what-is-incident-reporting-and-why-is-it-important/>. [Accessed 2024].
12. B. Lutkevich and J. Scarpato, "instant messaging," TechTarget. [Online]. [Accessed 2024].
13. J. Wilkins, "Beginners' Guide to the Fundamentals of Flowcharting in Business Process Management," 2019. [Online]. Available: <https://info.aiim.org/aiim-blog/flowcharting-in-business-process-management>. [Accessed 2024].