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Information Dissemination via Short Message Service (SMS) To Reduce Disaster Risk

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ABSTRACT

This study developed an interactive information website that uses SMS technology to effectively communicate important information to San Carlos residents. The community's ability to respond quickly and effectively in the event of a flood or storm will be aided by this research. The study's objectives are to develop a web-based disaster response and management system, design post-disaster assessments improvements for disaster preparedness, and evaluate the system's acceptability. When conducting research using the development and experimental approach method, the researcher followed the Agile Development Methodology for the system's procedures, tools, and instruments. The results were also validated in the User Acceptability Test (UAT) using the Website Analysis and Measurement Inventory (WAMMI) Test and the Likert Scale, demonstrating that the study is highly acceptable. As a result, the testing system was found to be acceptable and trustworthy.

Keywords: Web-Based, Artificial, Disaster Risk, Short Message Service (SMS), Information Dissemination

INTRODUCTION

In disasters, risk communication aims to prevent and mitigate disaster harm, prepare the public before a disaster, disseminate information during the disaster, and aid recovery. SMS broadcast is a method of sending messages to cellphones based on their location to pre-determined cell sites. It also enables location-based alerts without requiring the registration of mobile phones.

A persistent societal problem necessitates an immediate solution when the very nature of a community's existence is in jeopardy. Every year, natural disasters wreak havoc on the Philippines, killing thousands of people, destroying property, and causing billions in economic losses. Most deaths were attributed to landslides triggered by the quake. Climate and geophysical disasters are a recurring issue in the Philippines, necessitating swift and immediate action to mitigate their effects.

Because the human and financial costs of these disasters are so high, disaster relief efforts must explore and test all possible solutions.

The goal of this study is to inform the citizens of San Carlos City, Pangasinan, about weather conditions, the city's alert status, precautionary measures that people should take, and other important information about calamities that the City Disaster Risk Reduction and Management Office has been dealing with.

OBJECTIVES OF THE STUDY

The study's objectives are to (1) create a web-based disaster response and management system, (2) develop post-disaster assessments improvements for disaster preparedness, and (3) evaluate the system's acceptability.

MATERIALS AND METHODS

In this study, developmental and experimental research methods were employed. Gathering and eliciting the system's requirements before building the system around them is part of the method.

Agile development is an example of an incremental model. Small, quick software increments are developed. As a result, small incremental releases are made, each of which improves on the previous one's functionality. Each new release is thoroughly tested to ensure software quality. The developer made this decision based on the agile manifesto, which considers people and interactions, working software, customers, associations, and change management

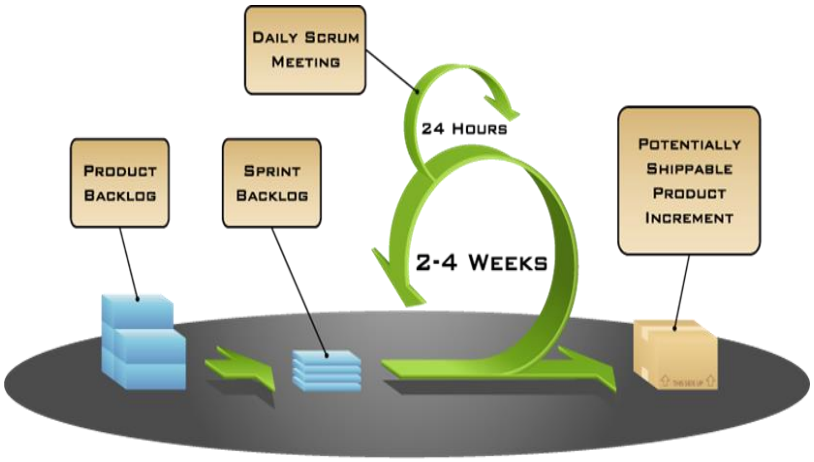

Figure 1 Agile Scrum Methodology

Product Backlog Refinement

The product backlog is a meeting that occurs after some sprint to ensure that the backlog is ready for the following sprint. backlog refinement serves as a barrier rather than a full-feathered resolution attempt in this respect. This gives the product owner adequate time to deal with any problems that emerge. Some teams feel that having weekly meetings rather than monthly meetings is more suited for their rhythm, which is acceptable.

Sprint Planning

Each iteration starts with a sprint planning meeting. The product holder gathers the team to evaluate which stories are the most critical and should be handled first. Following that, the team breaks down

the stories into tasks, which are then put into the sprint backlog. While sprint planning meeting is attended by the product owner, Scrum Master, and the comprehensive Scrum team. The team may invite external stakeholders, although this is unusual in most businesses.

Daily Scrum

The daily scrum is also well-known as a daily standup meeting. This ensures that everyone on the team understands what's going on. Each team member presents what they've completed since the previous standup, what they want to accomplish before the next one, and any obstacles they've faced. The daily Scrum meeting is a brief meeting held each day, preferably at the start of the workday. Every team member who helps to complete a sprint is obligated to participate. All team members must be present for the whole meeting and must stay standing. The duration of the daily Scrum meeting should not exceed 15 minutes. However, no objections or concerns voiced during the discussion may be rejected owing to a lack of time. Any complaints or concerns raised during the meeting should be noted by the Scrum Master and addressed as soon as possible.

Sprint Review Meeting

After each sprint, the team has created programmed, tested, and useable software. Following each sprint, a Sprint Review meeting is conducted. Throughout this meeting, the Scrum Team will show which Scrum Product Backlog items they finished during the sprint. Demonstrations of the new features might be used to do this. It's worth mentioning that backlog tasks that haven't been finished won't be shown. These things may be done as well if they aren't already. Instead, the remaining items/activities will be re-estimated and finished in one of the sprints below.

Sprint Retrospective Meeting

In the "inspect and adapt" approach, this is an important phase. If this meeting does not take place, the team will never be able to increase its total production and concentrate on the team's overall performance. Therefore, concrete performance suggestions should be accessible after the meeting. Finally, the scrum master organizes a retrospective meeting with the team after each sprint. They discuss what went well, what didn't, and how they might make the subsequent sprint better. The product owner is similarly there and will listen to the team discuss the good and bad parts of the sprint. This approach allows the whole team to focus on overall performance and identify improvement initiatives. Because the Scrum Master can recognize and resolve typical barriers, it is crucial. Through the sprint planning meeting, the product owner introduces the team to the most critical features. A high-level product backlog user story is converted into more granular sprint backlog tasks by the team by asking enough questions. The product owner is not needed to explain every item in the recorded product backlog. It's a decent rule of thumb to arrive at the sprint planning meeting with enough product backlog items to cover two sprints.

Instrumentation and Data Collection

Interview

This is the major approach for collecting data throughout the systems analysis stages of a development project. This is something that every analyst should be capable of. The kind of data that can be acquired, as well as the quality and strength of the data, is determined by the analyst's interviewing abilities. The researcher creates an interview guide question for the in-charge officer of the City Disaster Risk Reduction Office.

Questionnaire

It's a questionnaire that asks the responder to answer a sequence of logically connected questions. The researcher found areas where the study may be improved, notably the CDRRMO's Disaster Risk Mitigation program. The developers learned that the CDRRMO did not monitor the bulk of San Carlos' barangays when the calamity hit. In addition, the office was swamped with reports, and customers were having trouble filling in manual reports.

Survey

The problem is the process of concluding a research project. It helps concentrate emphasis on key parts of research and collect comparable results from various interviews done by the same or different interviewers. The researcher surveyed San Carlos City citizens to acquire information that would be relevant in completing the needed data and determined that the suggested approach would make the process simpler, quicker, more efficient, and more reliable.

Form and Document Analysis

Following the observation procedure, the researcher determined that the planned system or study has resulted in major changes in the government agency concerned.

User Interface (UI)

The system solves all the flaws that have been noted in prior systems; some of the system's characteristics are as follows:

a) All phones can send and receive SMS.

b) SMS from any phone on any network will be accepted.

c) It will accept SMS from all networks and phone kinds.

d) The inhabitants of San Carlos City are notified when they reach a decision.

e) Valid and invalid requests.

f) Personalization is straightforward.

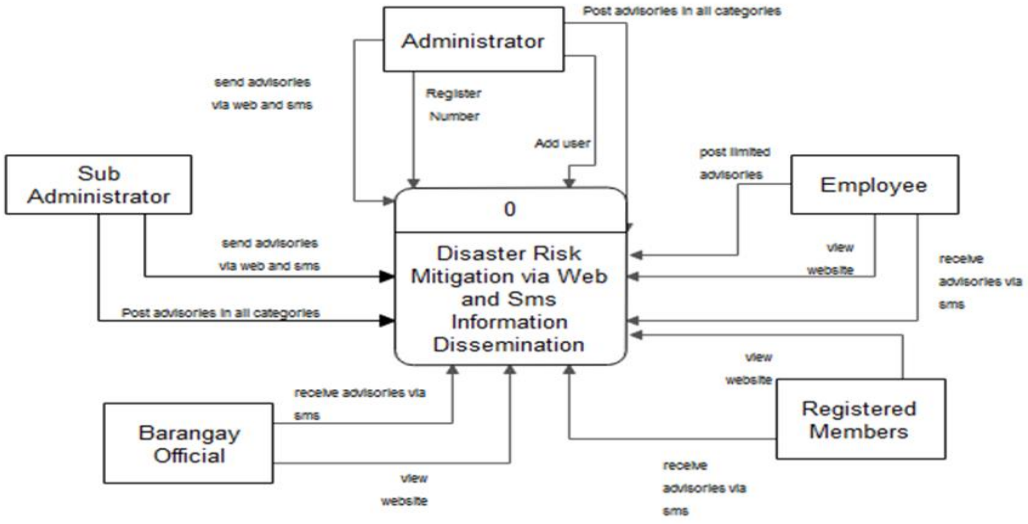

Figure 2. Disaster Risk Mitigation Using the Web and SMS in Context Data Flow Diagram

As depicted in Figure 2, the Disaster Risk Mitigation through Web, and SMS Information Dissemination procedure in San Carlos City, Pangasinan, involves the following users: Administrator, Sub Administrator, Employees, Barangay authorities, and Registered members.

Research Population and Sample

In research, sample size and population are important considerations. Approximately 200,000 people live here, according to the 2017 Census. The study sample includes employees of the City Disaster Risk Reduction Management Office and other government entities in San Carlos City. The respondents were employees from several government offices in San Carlos City, Pangasinan. A total of 20 people answered the survey. This investigation was conducted in San Carlos City, Pangasinan.

The study population sample technique was used to evaluate and compute the design, performance, maintainability, and safety rating of Disaster Risk Mitigation through Web with SMS Information Distribution. The researcher utilized a standard random sampling procedure. A simple kind of probability sampling. Every person in the residents has an equal probability of getting selected. Because every person in the population has the same probability of being a study participant, uncertainties are the most efficient sampling approach.

Statistical Tools

Using statistics is one way of organizing data. To acquire a wide picture of the overall issue, a statistical method is applied. The measurement system was employed by the researcher to monitor the respondents' perception of facts.

Table 1. The Five-Point Likert Scale

Scale	**Range**	**Interpretation**
5	4.6 - 5.0	Strongly Agree

4	3.7 - 4.5	Agree
3	2.8 - 3.6	Undecided
2	1.9 - 2.7	Disagree
1	1.0 - 1.8	Strongly Disagree

The weighted mean was utilized to determine the overall answer of the survey sample, whether they agreed or disagreed with a statement. For calculating the weighted mean, use the following formula:

Where

X – Mean

f – Weight is given to each respondent

x – Number of respondents

n – Total number of respondents

Mean

$$X = \frac{\sum fx}{n}$$

The survey responses were analyzed using statistical methods.

RESULTS AND DISCUSSION

The User Acceptance Test (UAT) is used to assess the functioning of the modified scheme once the enhancement step has been completed. The researcher utilized the standard Web Analysis and Measurement Inventory test to establish if the system is acceptable (WAMI). This is a customer satisfaction measurement and analysis service for websites (Alva et al., 2003). It is the most effective technique for assessing user experience as it pertains to a website's users (WAMMI, 2014). Nigel Claridge and Jurek Kirakowski created WAMII, which comprises 20 statements picked from a huge number of inquiries concerning consumers' interactions with websites. It's based on five factors: beauty, controllability, efficiency, helpfulness, learnability, and memory.

The following table summarizes the input from the associated users such as learnability, the efficiency of use, dependability, and rememberability. To make sense of the numerical data that had been structured, a Likert rating scale of one to five was utilized. The Likert scale goes from one to five, with one indicating a strong dislike for the notion, two suggesting strong hate for the concept, three indicating undecided, 4 indicating agreement, and five indicating a severe dislike for the topic.

A learnable accurate notion is a precise concept in the design and development of goods, software, and user interfaces. Learnability (the ease with which users can grasp software applications) is important because the better an application's learnability is, the less training and time it will take for a person to learn how to use it.

Table 2 shows the criteria used to assess the system's learnability. Learnability refers to how quickly

people get familiar with a system. The table reveals that "finding my way around this system is not a problem," with a weighted mean of 4.35, has the greatest rate of learnability, while "using this system for the first time is straightforward," with a weighted mean of 4.0, has the lowest rate. The table's standard weighted mean of 4.11.

Table 2. System Evaluation for Learnability (WAMMI Questionnaire)

Learnability	Mean	Description
1. The system doesn't need more introductory explanations.	4.00	Agree
2. learning to find my way around this system is not a problem	4.35	Agree
3. Utilizing this system for the first time is easy	4.00	Agree
4. remembering where I am on this website is not difficult.	4.05	Agree
Weighted Mean	**4.11**	**Agree**

Legend: SA-Strongly Agree, A-Agree, U-Undecided, D-Disagree, SD-Strongly Disagree

The system's usability is determined by features that are easy to locate, load quickly, and search quickly. As indicated in table 3, the highest rating for efficiency of use is 4.85 weighted means, while the lowest rating is 3.85 weighted means for "Using this system for the first time is straightforward." Most respondents feel the system is efficient in terms of speedy access, according to Table 3, with a weighted average mean of 4.21.

Table 3. System Evaluation Criteria for the Efficiency of Use (WAMMI Questionnaire)

Efficiency of Use	Mean	Description
1. It is not difficult to move around this system	4.10	Agree
2. I can quickly find what I want on this System	4.00	Agree
3. This system seems unlogical to me	3.90	Agree
4. This system helps me find what I am looking for	4.30	Agree
5. The system is fast and responsive	4.15	Agree
6. I can easily contact the people I want on this website	4.30	Agree

7. I feel efficient when I'm using this system	4.75	Agree
8. It is not difficult to tell if this system has what I want	3.90	Agree
9. Using this system for the first time is easy	3.85	Agree
10. Using this system is not a waste of time	4.85	Agree
Weighted Mean	**4.21**	**Agree**

Legend: SA-Strongly Agree, A-Agree, U-Undecided, D-Disagree, SD-Strongly Disagree

Table 4 shows the evaluation criteria for the system based on user satisfaction. The word "user satisfaction" refers to a user's level of comfort with a system. Table 4 reveals that the greatest user satisfaction rates (4.75 weighted mean) are for "I can easily contact the individuals I want on this system" and "Using this system is not a waste of time," while the lowest user satisfaction rate is for "It is difficult to discern whether this system provides what I want" (3.90 weighted mean). Table 3 shows that the system has a weighted average mean of 4.34, suggesting that most users find it highly user-friendly.

Table 4. System Evaluation Criteria for the User Satisfaction (WAMMI Questionnaire)

User Satisfaction	**Mean**	**Description**
1. The system has much that is of interest to me	3.95	Agree
2. The page on this system is very attractive	4.70	Agree
3. I feel in control when I'm using this System	4.0	Agree
4. I don't like using this system	4.15	Agree
5. I can easily contact the people I want to on this system	4.75	Agree
6. It is difficult to tell if this system has what I want	3.90	Agree
7. This system has favorable features	4.30	Agree
8. Using this system is not a waste of time	4.75	Agree
9. I get what I expect when I click on things on this system	4.15	Agree
10. Everything on this system is easy to understand	4.70	Agree

	Weighted Mean	**4.34**	**Agree**

Legend: SA-Strongly Agree, A-Agree, U-Undecided, D-Disagree, SD-Strongly Disagree

Table 5 below shows the results of the system evaluation based on the reliability of use. A system that is always available and complete is referred to as "reliability." According to the table, the highest rate of reliability is 4.65 weighted mean for "This system is very fast," and the lowest rate is 4.20 weighted mean for "I get what I expect when I click on this system," indicating that the system is reliable, available, and all links are indicated, and the function is active.

Table 5. System Evaluation Criteria for the Reliability (WAMMI Questionnaire)

Reliability	**Mean**	**Description**
1. This system is very fast	4.65	Agree
2. I get what I expect when I click on this system.	4.20	Agree
Weighted Mean	**4.43**	**Agree**

Legend: SA-Strongly Agree, A-Agree, U-Undecided, D-Disagree, SD-Strongly Disagree

Table 6 shows the criteria for assessing the system based on the user's recall ability. In the table, the weighted average mean of 4.05 reflects how effectively the system supports the user in remembering the system's properties. Recall ability, in another meaning, refers to the system's ability to remember the user and assist them in completing tasks more quickly.

Table 6. System Evaluation Criteria for the Remember ability (WAMMI Questionnaire)

Remember Ability	**Mean**	**Description**
1. Remembering where I am on this website is not difficult.	4.05	Agree
Weighted Mean	**4.05**	**Agree**

Legend: SA-Strongly Agree, A-Agree, U-Undecided, D-Disagree, SD-Strongly Disagree

Table 7 shows the overall weighted average mean for the acceptability of Disaster Risk Mitigation via Web with SMS Information Dissemination, which is highly acceptable with a weighted average mean of 4.23 based on criteria such as learnability, the efficiency of use, user satisfaction, reliability, and remember ability, as well as the evaluation in terms of the overall acceptability of the developed system, which indicates that the system is stable.

Table 7. Generated Weighted Mean for Acceptability of the Disaster Risk Mitigation via Web with SMS Information Dissemination (WAMMI Questionnaire)

Description	**Mean**	**Description**

Learnability	4.11	Agree
Efficiency Of Use	4.21	Agree
User Satisfaction	4.34	Agree
Reliability	4.43	Agree
Remember Ability	4.05	Agree
Weighted Mean	**4.23**	**Agree**

Legend: SA-Strongly Agree, A-Agree, U-Undecided, D-Disagree, SD-Strongly Disagree

CONCLUSION

Following are the conclusions reached based on the findings:

1. To elicit needs, the system was able to create and design.
2. The developed solution bettered the system's preparation by securing and maintaining vital information.
3. The findings demonstrate that the respondents agreed with the system that was tested and appraised, indicating that it is very acceptable

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