

Creating a Community-Based Disaster Management System

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ABSTRACT

This research is aimed into Malaysia's efforts to harness ICT's pervasiveness to manage natural and man-made calamities. These efforts have resulted in various agencies and programs ranging from forecasting to coordination and monitoring, but the number of fatalities during such inevitable catastrophes has been a major worry. Unfortunately, as seen by recent storms in Malaysia, the number of such calamities continues to rise. A proposal to create a crisis management joint platform will work alongside government departments, allowing for real-time sharing of knowledge, resources, and information. The building of the mosque drew the community into the system since they are seen as the closest to the people. These actions will surely bolster the government's attempts to meet its objectives. As a result, experts suggest that teaching these communities, which are expected to form a volunteer community, the science of gathering information and putting it to good use in the case of a disaster, would go ways away beyond maximizing tax dollars.

KEY WORDS: Framework for Societies, Disaster, Disaster Management, collaborative system, Flood, Balanced Scorecard.

1. Introduction

To the point where the entire world is now IT-based, information systems have become the backbone of all companies, including government institutions. This implies that IT is now used in every aspect of government and business, including disaster recovery. The ability to use the skills provided by this technology gives businesses a competitive edge in judgment, which is crucial during day operations. As a result, businesses have recognized the value of software development in achieving their mission and goals and tactically positioning business for strategic edge. As a result, Technology divisions have evolved from generic service suppliers to partnerships (Venkatraman, 1999), and it's comprehensible that IT social welfare was becoming "mission critical" in areas including banking, medical, security, and resource stewardship. As a result, information technology has become critical.

There really are no disputing that natural and man-made disasters have become a reality we must accept. Though we've progressed in our research of the seas and sky into the firmament to the point where we're considering a vacation or retreat there, living on the mother earth, which is our home, has been difficult and scary. Like a consequence, the fact that one disaster or another strikes the world's surface year after year is no longer news. Despite technology improvements, neither developed nor developing nor poor countries are exempt, and the aftermath has been causing for concern. In the recent decade, the tsunami in Indonesia in December 2004, Hurricane Katrina in the United States in July 2015, and now the floods in

Chinese, sequentially, have struck the world, including Australia, Malaysia, and Pakistan.

Could this also be stated of emerging countries, whilst developed countries do everything, they can to mitigate any potential and engage in a systematic approach to disaster management, taking advantage of omnipresent software development? The recent rainfall in Pakistan smacks me of the 1970s floods in the country, and the country's poor response at the time, which eventually contributed to Bangladesh's secession in 1971. Disaster management can be frightening at times, especially when one considers history. "Once beaten, twice shy" is a phrase that springs to mind. In a society in which life administration in these kinds of critical situations has progressed enormously, the recent rains in portions of Malaysia are cause for alarm. despite the government's active efforts, we continue to record a significant loss of lives and absent individuals.

2. LITERATURE REVIEW

In practice, disaster management entails planning ahead and being effective in preventing a breakdown. It's about how to cope with the circumstance as soon as it arises. It entails disaster preparedness (e.g., urgent removal, confinement, bulk purification, etc.) and post-disaster support and rehabilitation (Wikipedia 2020).

Whenever there is a crisis, "the deed would have been done" already, regardless of how effective the reaction

is to save lives and property. However, such action, let alone abstention, need not detract from the fact that there has been an irreversible loss (Ye & Wen 2019). Risk (Disaster) Management is the process of controlling or minimizing the likelihood of such events occurring.

The integration of preparedness at all branches of administration, as well as quasi engagement, is required for effective disaster management (Wikipedia 2020). According to Chatfield et al (2020), in order to better disaster management, the government must include innovations (like as GIS and RFID) through its e-government guidelines:

- Prior to a disaster, efforts to organize for the inconceivable and increase the ability of corporations and societies to quality and efficiently to disasters are referred to as capability. "While individual agencies often construct disaster plans, one issue of disasters is that they require response from agencies and groups that may not operate closely together on a daily basis."

- Search-and-rescue efforts, for example, are carried out quickly after a tragedy "to provide emergency assistance to victims." "When disaster occurs, the response phase begins with the goal of minimizing life-threatening situations, providing life-sustaining aid, and preventing further property damage" (Chatfield, et al 2020).

Three themes emerged from the legal and compliance viewpoints following the 1992 UNCED summit in Rio de Janeiro (Post & Altman 1999):

Governments around the world must be proactive in tackling pollution control issues.

To handle trans-border pollution challenges, regional and global cooperative arrangements must be formed.

Interventions that justify environmental externalities should be avoided, while regulation and taxation should be utilized to discourage environmentally detrimental behaviors and promote environmentally friendly alternatives.

With this in mind, a campaign for the "Sustainable Development" philosophy was launched, in which industries were forced to be community-friendly in their projects. This trend positions a more community-friendly company in the center of the community, which has been shown to benefit such businesses (Post & Altman 1999). We exist in a universe where environmental concerns must be prioritized in order to avoid calamity. What we see now is a reminder that

much more has to be done if this world is to be habitable for us. It also relates to Post and Altman's (1999) comment on the subject of previous floods, ranging from the Pakistan flood to the Oklahoma flood, the Australian deluge, and the most contemporary another in Sri Lanka:

If the ecology is to be adequately safeguarded, more cooperation connections between commerce, administration, and public are essential.

A new framework is needed to account for negative externalities.

Whereas if surroundings are to be effectively protected, more cooperative relationships between business, government, and society are required.

A 10-year plan was adopted at the Globe Conference on Disaster Reduction in Kobe, Hyogo, Japan in January 2015 in an effort to make the globe safer from natural catastrophes. The Joint comprehensive Masterplan (HFA) is a worldwide blueprint for hazard mitigation activities during the next decade. It covers the years 2005 to 2015. Its goal is to decrease catastrophic problems in revenue of deaths, socioeconomic losses, as well as community and country positive externalities, significantly by 2015.

Basic rules, action targets, and genuine solutions for emergency preparedness in sensitive areas are included in the Plan.

1. Ensure that disaster risk reduction is a national and local priority with a solid institutional underpinning for implementation.

2. Identify, assess, and monitor disaster risks to improve early warning.

3. Foster a culture of safety and resilience at all levels by utilizing knowledge, creativity, and education.

4. As said in #4, improve disaster readiness at all levels to ensure effective response (2005 World Disaster Reduction Conference).

Our current study will look into community engagement in disaster management for achieving this goal, keeping in mind the fifth requirement and the earlier orientation from the literatures given thus far. This will be done with an emphasis on the importance of including community members (volunteers) in disaster preparedness so that government agencies' efforts to make the public happy produce the desired consequences.

3. APPROACH

We proposed linking the Division of Hydrology (DID) with regional Muslims' rear systems to facilitate information exchange. A visit to the DID office was made in order to get first-hand knowledge on the systems architecture used for catastrophe alerting and monitoring. The visit was carried out by the

researchers, after obtaining a letter of introduction from the Information Systems department, on the 17th February, 2020.

3.1 INTERVIEW

Although conversations are thought to provide a wealth of useful information, their primary objective is to collect a certain type of data. The researcher is curious about what's "on someone else's mind" (Patton, 1990: 278). Patton claims that:

"We interview people to find out from them those things we cannot directly observe, we cannot observe feelings, thoughts, and intensions. We cannot observe behaviors that took place at some previous point in time. We cannot observe situations that preclude the presence of an observer. We cannot observe how people have organized the world and the meanings they attach to what goes on in the world. We have to ask people about those things. Then the purpose of interview, is to allow us to enter into the other person's perspective" (p. 196).

Interviewing is the best strategy to use when conducting intensive case studies of a few selected people. As a primary technique of data gathering, interviews should be conducted in the most effective manner possible.

The concept of community involvement, to the level of this plan, is unique to the organization, according to an unstructured interview. There is without a doubt a system named INFOBANJIR at hand, which, among other things, can do the following:

- Sends information about water level and rainfall through GPS/radio to the master server
- Sends SMS to dedicated members on water level as it may affects the road users

3.2 CURRENT SYSTEMS

The system monitors water level from time to time and sends same in real time. Also, there is an alert system in some dedicated areas, which is capable of triggering an alarm on the water level reach a danger level. We gathered that feedback from the users has been based on verbal or phone calls and this explains the intermediary function of the district offices.

Each district office is connected to the police department, the Public Works Department and Malaysian fire service department to attend to issues of flood management in the said district.

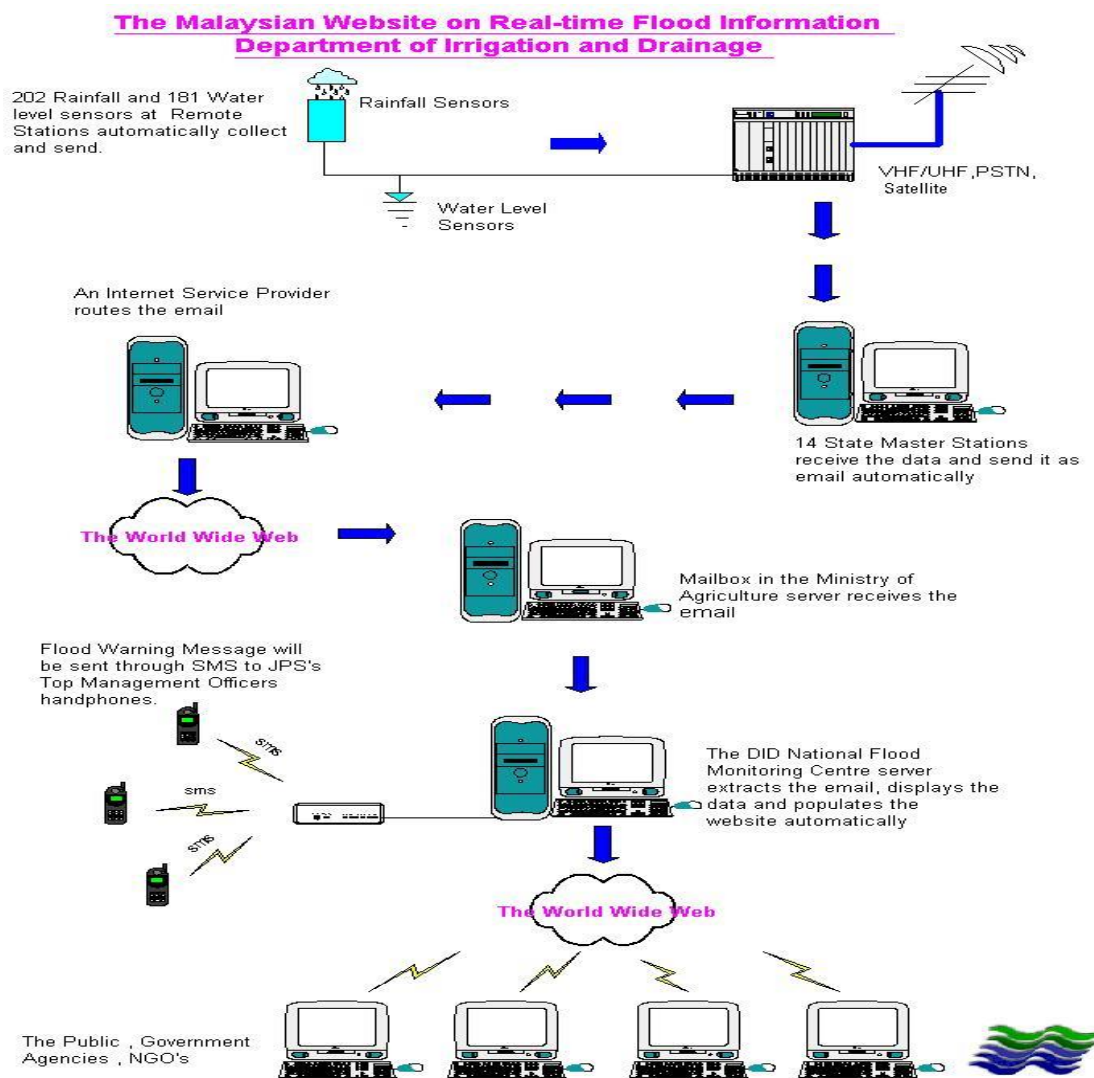


Figure 1: The Infobanjir System Diagram (2021)

3.3 PROPOSED SOLUTION

When confronted with the fact that there is a need to integrate the communities as a whole, the officer, who attended to us, felt that; “because we didn’t have a long history of disaster” then that has not been given a thought at all. However, the officer, after explanations were given on how the proposed system will work, agreed that it is a noble idea. We expect that DID will establish a Letter of Understanding with other agencies' databases, enabling for real-time information and resource exchange.

We looked into the Sahana software system, which is

a gnu general public license system. In the aftermath of the tsunami of 2004, a project was born out of the need for a catastrophe management, collaboration, and coordination application (Careem et al. 2017). We regard this program, which has piqued the interest of international designers and philanthropic specialists, as a useful tool for demonstrating the necessity for the proposed society monitoring system. The FOSS philosophy and charitable needs go nicely together, which is one of the key reasons for Sahana's success (Careem et al. 2017).

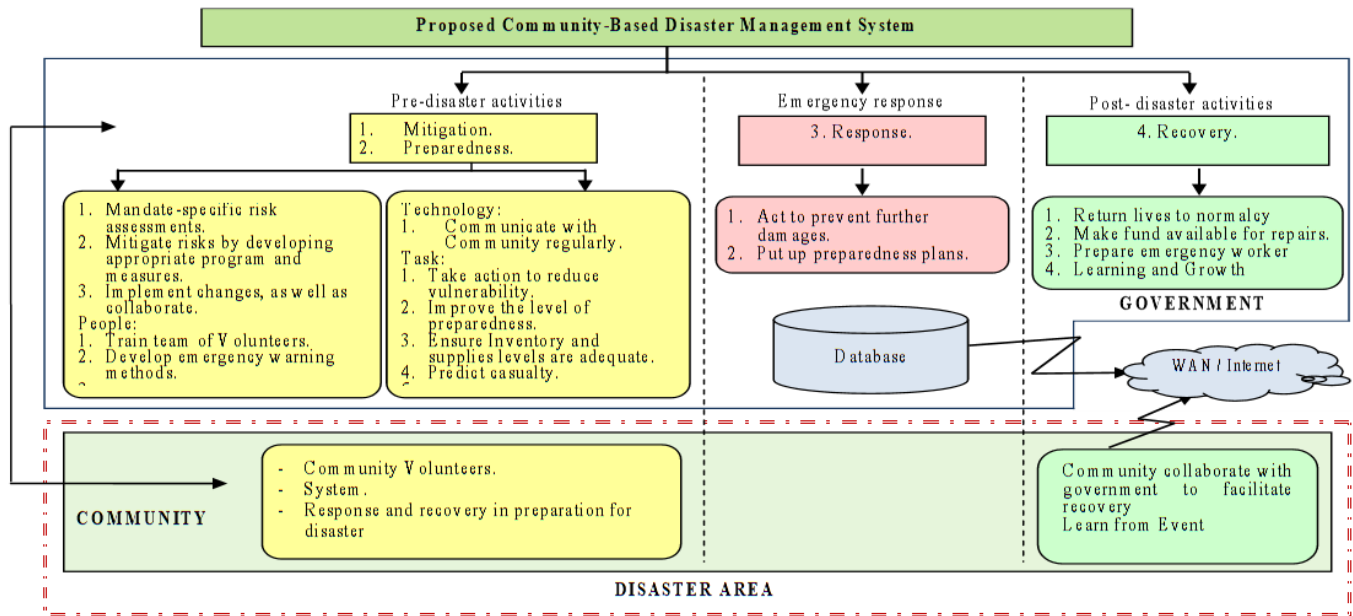


Figure 2: Proposed Community-Based Disaster Management Framework

4. SYSTEM OVERVIEW

At the current section we have the following layers to represent:

LAYER 1: The community affected wherein mosques within it are grouped together and shares information and are interoperable within an intranet.

LAYER 2: The process owner (DID) as well as other governmental agencies relating together within an integrated enterprise in order to provide value added

services for government, NGOs and especially the communities.

LAYER 3: This depicts the public users who can access the website of DID and view with respect to any community the flood situation, can make donation available for the service of affected communities or get information about missing or dead relatives. They will thus have a firsthand information and could easily come up with claim on such.

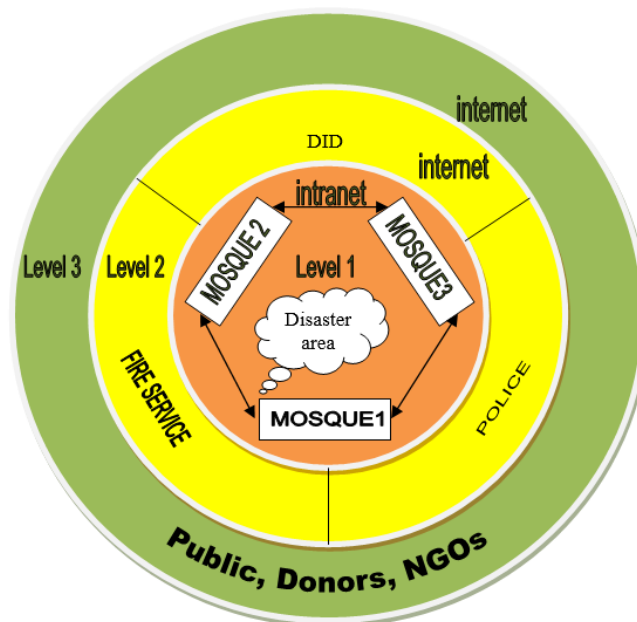


Figure 3: General Overview

1) SYSTEM REQUIREMENT

This is talking about the desired features of the Community-Based Management System. It is to take into consideration the participating stakeholders' requirement to participate in the success of the system. The following best describes what each requirement is:

i. DEPT OF IRRIGATION AND DRAINAGE (DID)

It receives triggers alert from its systems and other agencies and send same.

It receives information from the participating communities and sends same.

It triggers alert to the communities, the district offices and the co-operating agencies to emergency works.

It hosts web site that will be all inclusive; vis-à-vis new features that depicts two-way communications.

It institutes an emergency work and rescue team to the affected communities.

It institutes sharing of information with the communities connected to its databases; the communities receive information from the DID and can writes to it but cannot edit it.

It exchanges useful information with all other agencies on the weather and such effect on communities.

It keeps track of training and workshops to the community volunteers.

It establishes a two ways interaction with all participating communities.

ii. COMMUNITY

Community interaction with DID on information sharing basis.

Mosques' interaction within intranet to share information and resources in real-time.

Keep an army of volunteers who are trigger ready to provide first aid assistance during emergency.

Keep up to date information and sends same to DID on a real time basis.

Triggers alerts into the devices distributed to the volunteers and other workers

Keeps track of enlightenment within the residents on the need to be environment conscious.

Advocates first aid steps to take in the eventual occurrence.

Collaborate with the emergency workers when disaster occurred.

iii. AGENCIES

Other agencies interact with the DID on a collaborative basis to save the communities.

They share information based on a memorandum of agreement via real time integration.

The relevant agencies make available emergency workers when the needs arise.

The relevant agencies put up with reliefs materials in post event reconstruction needs.

iv. GOVERNMENT AND THE PUBLIC

The public can access the DID web services to keep update on occurrences.

Government Shares information on an integration level

The public will through the internet access the web site of DID to know the situation

Donate relief materials and other necessities required. Institutionalize other services when urgently required.

2) THE DOMAIN DEFINITION

This is like providing for a framework for the conceptual system within the community-Based management systems. The appendices shows a vivid lay out of the user interface.

Community-Based Disaster Management Systems Domain Definitions	
DOMAIN	SCOPE OUTLINE
Disaster Management	<ul style="list-style-type: none"> ✓ Mitigation ✓ Trigger alert to and receives same from governments agencies and NGOs ✓ Register Volunteers, and other details of incidents within the communities ✓ Provides training ✓ Provides needed logistic during and after disaster
Community Preparedness	<ul style="list-style-type: none"> ✓ Sends alerts and receives same from DID

	<ul style="list-style-type: none"> ✓ Provides needed enabling environment for emergency works ✓ Take stock before any occurrences and update that in real time ✓ Afford interaction with other centers within the community (intranet) ✓ Keeps at alert the Volunteers
Rescue management	<ul style="list-style-type: none"> ✓ Share information in real time with DID ✓ Provides logistic ✓ Monitors information from DID and when alerted; moves in to provide emergency works ✓ Locate missing person or items and update to DID in real time ✓ Garner fund and materials
Public contributions	<ul style="list-style-type: none"> ✓ Access situation at the community ✓ Identifies kin and provides necessary information ✓ Donate ✓ Volunteer for emergency works

3) BUSINESS IMPERATIVES:

The management of information has tremendously changed when one cursory compare the environment we're in now (with the Internet or the cell phone) with what used to be perhaps a decade or two decades ago without these devices. Live is becoming unthinkable without them now. Taking up the real time concept (information has to flow) then there is a need for organization to embrace real time concept so as to remain relevant and achieve. To accomplish this, the system should include the following features, among others:

i. Entrepreneurial Mission

Web based systems are made available so that the community and the DID may collaborate quickly on Knowledge transfer, selection, and readiness are all important.

ii. Corporate Motivator

To devise a methodology that can retain real-time information on public events. DID will have real-time access to this information. In the long run, such a system should save citizens in disaster zones time, cost, and lives. "In many circumstances, there will be a requirement for import of data that has been acquired by individuals or organizations that did not use the system," (Careem et al. 2016) reasoned. Some assistance is required to improve the quality of the imported data."

iii. Operating Model

It organizes community and agency collaboration in a way that is both convenient for all parties involved and results-oriented. During a crisis, GIS capability adds value to the system and draws a lot of attention, according to (Careem et al. 2016). Adjusting the basic GIS map to the disaster's location and uploading map files from the afflicted areas may require customizations. As with most implementations, internationalization is a must-have functionality. The sentence translation to the native language of the interface can be changed.

iv. Scope of Application

The immediate preparation and response of community volunteers greeted the government system's real-time activation of a warning. Virtual criticism on further leisure and the present crisis, as well as a donation to the affected community

v. Metrics of Performance

The connecting signal has a 90% on strength, a 5 second reaction time, and the flexibility to change data granularity. In a disaster, complex systems that are unable to adjust to the loss of precise data collection may fail. According to experts, a crisis management solution should work even if there is no communication infrastructure (Careem et al. 2016). Disconnected operations must be appropriately planned for, as well as the lack of immediate data synchronization. Furthermore, all solutions should

run on commodity hardware if possible.

vi. Frameworks

Attractive environment, certainty of wellbeing, and minimization of death and property loss, all of which save the government money and improve their image among the general public. "Organizations and governments adopt different approaches to ensure data protection," (Careem et al. 2016) asserted. In some cases, security precautions at the critical look database columns are required. Typically, the requirements are broader."

fulfill the desired business purpose by establishing a community-based management system that is integrated into the agency's system in order to achieve the goal of equitable catastrophe management. The system's financial investments and contributions must satisfy the end users, i.e., the community and its citizens. Based on the balanced scorecard metric framework launched by Dr. Kaplan and Dr. Norton, which provides such intangible evaluation, and the complete proposal of Dr. Kaplan and Dr. Norton, we adapt Zachman's framework to define what our expectations on such a system should look like (Moe 2017).

4) THE BALANCED SCORECARD'S KEY PERFORMANCE INDICATORS

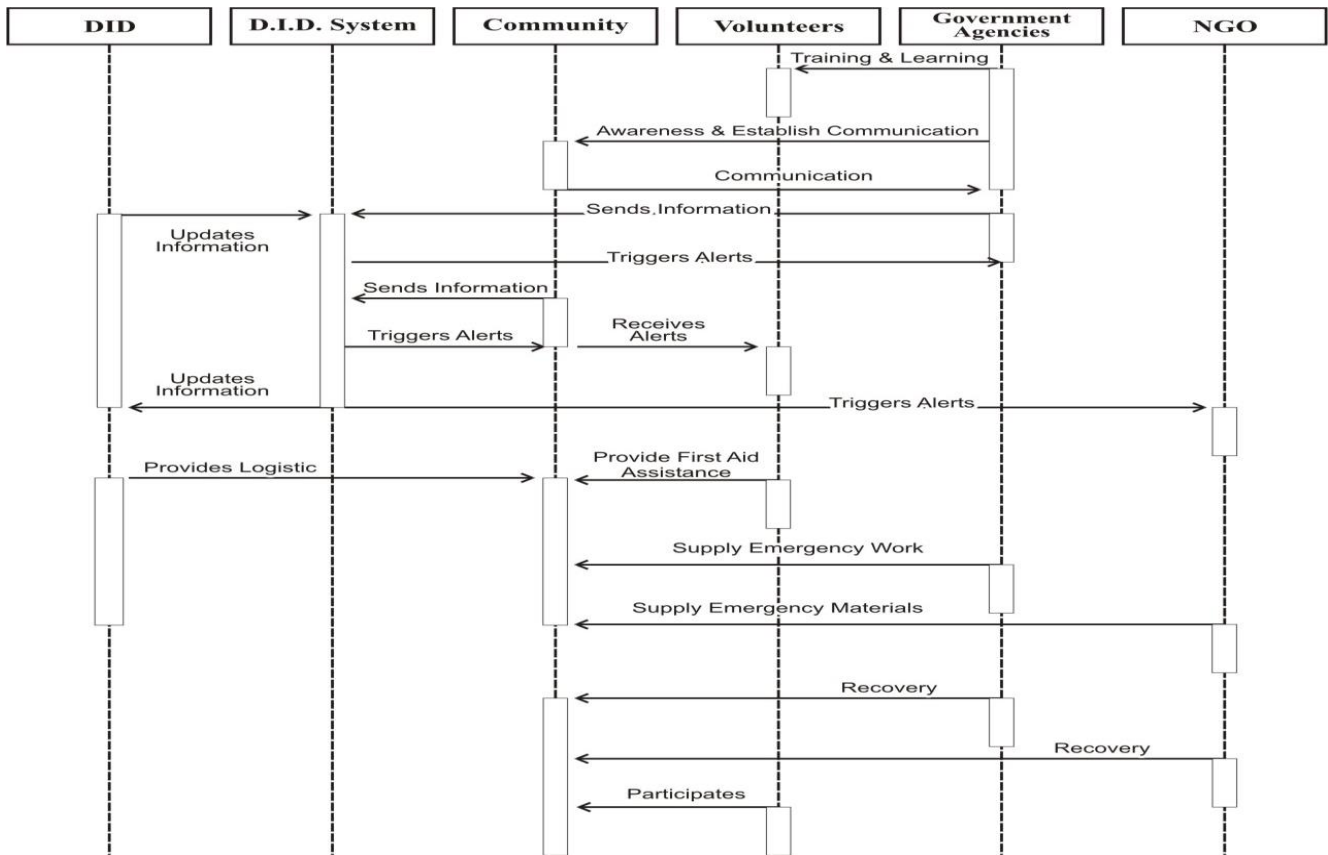
Agencies must take advantage of opportunities to

Perspectives	OBJECTIVES	MEASURES	TARGETS	INITIATIVES
Financial / Donor	Improve disaster awareness in the community	Infrastructure and logistics are provided.	Generate volunteers who are trained in first aid.	Create a distributed database that is integrated.
	Inculcate in the community a participative culture.	Gives sufficient expertise	Allow employees to be 100% trigger aware.	Install and Configure Customer Software Tool.
	Volunteers should be well trained.	Limit the number of people killed and property destroyed.	Assist to the nation's prosperity and stability	Ascertain information sharing compliance.
Customer / Communities	Community perceptions of Agency services	Participation of Communities Has Increased	Dedication to the Agency's goals	Guarantees that CBMS is operational at all times.
	Partnership	Improved sharing of information	A 90 percent grade for quality performance	Frequent disaster management training
	Becoming a flexible organization		Community willing to support Agency efforts	Compliance is enforced by enforcement.
Internal Business Process	Products that give you a competitive edge	Recognize and honor great institutions.	Secured, good cycle time system with 99% performance yields	Create a service-oriented architecture (SOA).
	Information will be shared with all other agencies through an integrated system.	Because of information sharing, enter into a Memorandum of Understanding with other agencies.	Develop secured and recoverable database	Regularly encourage monitoring and assessment initiatives.
	Instant spontaneous alert system	Because of information sharing, enter into an SLA with communities.	React to community requests with only 3% downtime	Put up a security enabled system
Learning and Growth	Provide an employment opportunity for potential participants.	Promote community spirit through teamwork.	In the Community, an obligation workforce	Evaluation of team readiness on a regular basis
	Verify that the CBMS is secure and reliable.	Community Management Centers receive training and workshops.	Reliable, Incorruptible Lifeline focused Volunteers	Emergency responders, volunteers, and mosques have all received the Award of Excellence.
	Learning from	Maintain a high level in	To allow for learning	Evaluate the national

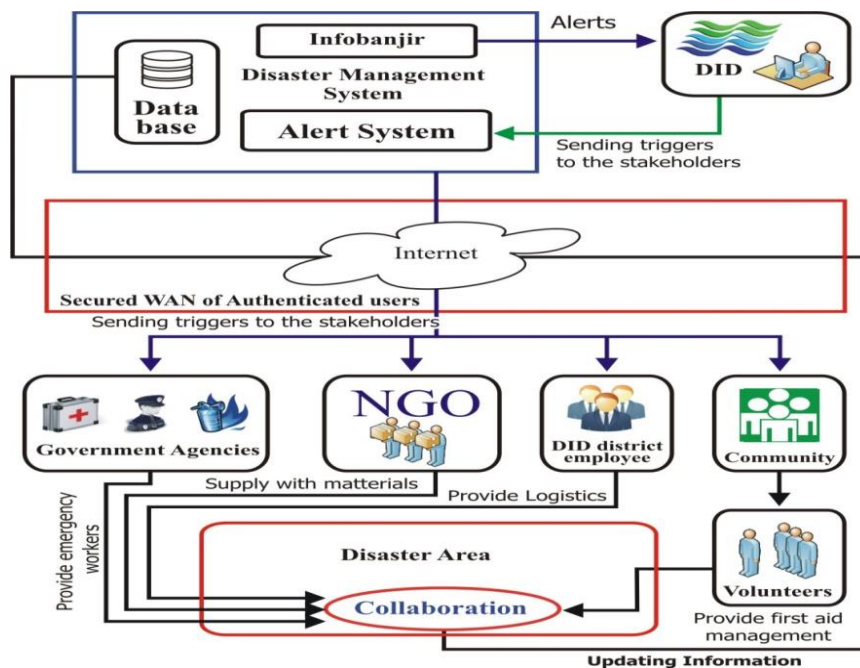
	experience to improve expertise	all endeavors and follow correct documentation.	and growth, ensure that knowledge is shared.	impact of emergency preparedness.
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Table 1 - Using Zachman's Framework as a guide, create KPIs for the proposed system.

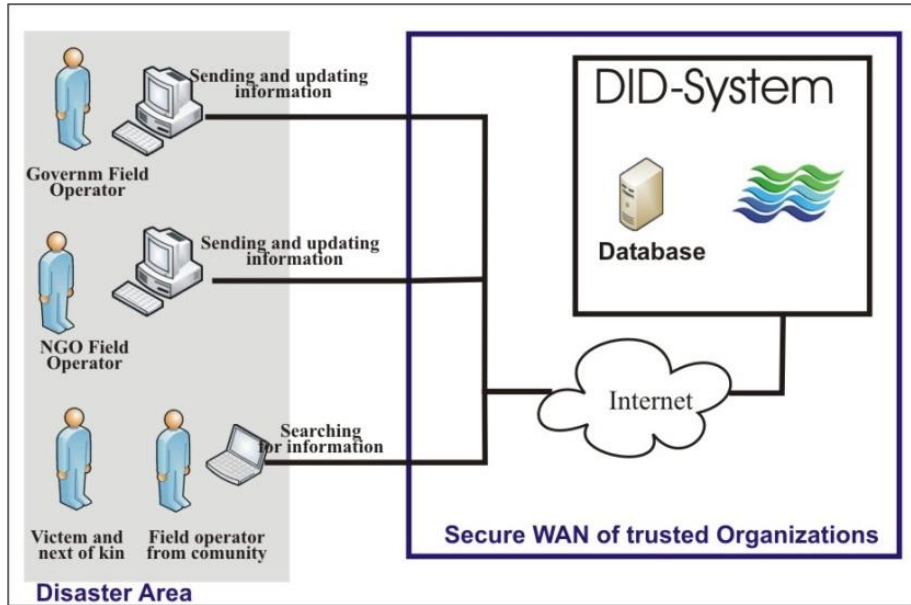
5) THE SEQUENCE DIAGRAM:



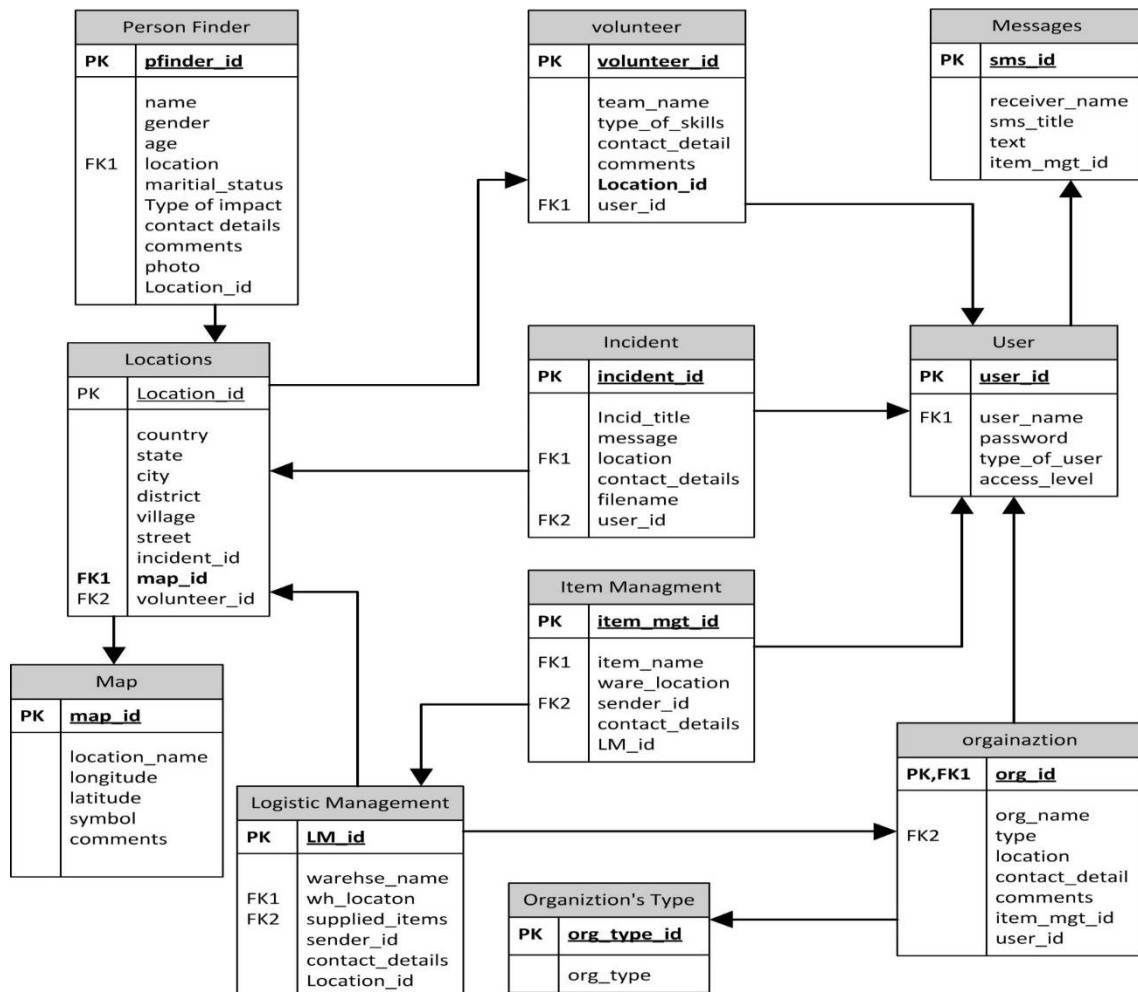
6) THE ACTIVITY DIAGRAM



7) THE PERSON FINDER FUNCTION DIAGRAM:



8) THE CLASS DIAGRAM



5. CONCLUSION

Leadership is thought to be an obligation: "Each of you is a steward," as one renowned tradition goes. And regarding your flock, each of you will be questioned. A monarch is also a shepherd, and his sheep will be questioned. And every man in his family is a shepherd. Each woman is responsible for her partner's household and children. As a result, every one of you is a shepherd, and each of you will be questioned about his sheep (Khan 1994). That explains why, the apparent silence of any authority in the context of religious duty, for example, the heart and law of the Islamic faith forbid it. Despite the dangers of seizing control of someone's destiny, public activists will be better positioned to help the government make Malaysia a blunder state if they have access to information, good communication, and appropriate emergency training. Our examination at the DID found that the current "INFOBANJIR" system might still perform better, justifying the choice of "Sahana," an accessible emergency management solution. Further institutions would be added to the presentation if it was a success, allowing for a full look of emergency preparedness. This should undoubtedly bolster the current administration's dedication to democratic accountability.

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