

Disaster Management Information Systems

Paminder Chawla

Student, Computer Science Department, MSIT, New Delhi

chawla.paminder@gmail.com

Abstract: This paper is about information systems designed for disaster management. It shows the importance of information systems in disaster management along with important components and technologies that can be incorporated to make an efficient Disaster Management Information System.

Keywords: Disaster, Information systems, DMIS (disaster management information systems), efficiency, response teams, government, NGOs (non-government organizations).

I. INTRODUCTION

A. What is Disaster Management?

According to [1], Disaster management (or emergency management) is the creation of plans through which communities reduce vulnerability to hazards and cope with disasters. Disaster management is quintessential for mitigating the atrocities and tribulations caused by disasters, be they natural or man-made. Examples of natural disasters are earthquakes, floods, tsunamis and man-made disasters include fires, nuclear hazards and wars. It should be noticed that disaster management means to tackle the effects of disasters and be prepared for them and not to prevent them.

B. What is an Information System?

According to [2], An information system is any organized system for the collection, organization, storage and communication of information. Such a system may be as simple as a 3x5 card catalog system on a desk, a Rolodex, a desktop calendar, or a Daytimer. Or, it may be as complicated as a multi-node computer database system used to manage vast quantities of related information.

C. Disaster Management and Information Systems

In the modern times, Information Systems have gained utmost importance in disaster management. Both government and non-government organizations have recognized the importance of a management information systems in response and relief process.

As seen in [3], The International Federation of Red Cross and Red Crescent Societies (IFRC) has recognized their Disaster Management Information System as a vital component. It has been mentioned that information management has been useful in the following ways for disaster management:

- Saves lives through early warning.

- reduces sufferings as they provide tracing services, concise information on assistance packages.
- Indicates when and where shelter will be provided.
- Promoting better media coverage which will attract global assistance for neglected disasters.

Government bodies have also come up with disaster Management Information Systems. As can be seen in [4], The Department of Planning of the government of Maharashtra has come up with a DMIS with the following objectives:

- To overcome limitation of existing system.
- Effective utilizations of natural resources database in event of disaster.
- Building decision support system for better district administration.
- Providing vital information related to pre-disaster and post-disaster at fingertips.
- Facilitating users for easy data integration.
- Editing, updating of spatial and non-spatial data at ease.
- To assist in post disaster damage assessment analysis.
- Provide centralized system that would be time & cost effective and maintenance free.
- Development of user friendly customized DMIS software.

Hence from the above examples of the use and importance of management information systems in disaster management, it is clear that these two entities go hand in hand.

II. IMPORTANT COMPONENTS OF DMIS

There are certain components whose inclusion are vital to the efficacy of the designed Management Information System. These components are-

A. Maps

Maps are required for planning and evacuation. Maps can be used to show areas at risk or areas where disaster had struck earlier. Maps might be of the whole world, individual countries, provincial or even of a single city or

town depending on the scope of the system. Geographical Information System (GIS) also include such concepts.

According to [5], Federal Emergency Management Agency (FEMA), an agency of the United States department of Homeland Security maintains maps showing flood hazards and patterns in the country. These are made available to local communities.

According to [6], The Maharashtra Remote Sensing Application Centre (department of planning, govt. of Maharashtra, India) has undertaken various projects with their DMIS mentioned earlier. One such project is for showing flood prone villages in the district of Solapur. A map is maintained for flood prone areas, settlements, water bodies, schools and hospitals.

Similarly, there are different modules for other purposes like risk assessment and infrastructure for the same district. Satellite images and real time images can also be included in the modules and projects taken up by various agencies so that the agencies fathom the situations better.

B. Records of Funds and their Mobilization

Maintaining records of funds provided for disaster management is very important to provide transparency to the whole process.

The information systems should be made public. People should be able to access information about the investments made. Funds allocated for various operations should be shown. Web and public libraries can be used to achieve this.

As can be seen in [7], The International Federation of Red Cross and Red Crescent Societies (IFRC) has a Disaster Management Information System through which members can get acquainted with the external and internal resources that are available.

Also, in [8], The Prime Minister's National Relief Fund, a government of India initiative maintains an open record of funds and gives access to all transaction history. The transparency thus maintained results in averting in any corruption or other unwanted activities.

C. Ham Operators

The disaster management information systems should consist of the records of HAM operators available in nearby areas.

According to [9] and [10], HAM operators or amateur operators are an indispensable part of the whole process. Effective communication is the key to disaster management and this cannot be achieved without HAM operators. It is quite likely that during the time of disasters like floods, storms or fire, phones and mobile

would not work or get lost in a calamity. Even underground communications lines could get disabled. Police, firefighters, military departments, all have different radio frequency. How do they communicate with each other when they have to coordinate during a rescue activity?

This is where these HAM operators come into play. They use high frequency radio sets to send long distance and accurate messages and information about current situations to the disaster response team. Being efficient, accurate and adaptive makes these amateur operators a very important record in the information systems for disaster management. HAM operators played a very important role in rescue process of the terrorist attacks on the world trade centre in New York, the Katrina hurricane in and countless other disasters whose records were being duly maintained.

D. Information about Nearest Response Teams

This is another part that should be emphasized in the Information system for disaster management. The location of the response teams, their distance from disaster prone areas, the extent to which they can provide help and how fast, all these details should be maintained. This will enable quick and efficient actions.

We can take an example from [11]. SRISTI, a NGO maintains a DMIS which contains information provided by civil society volunteers about what kind of support they can extend, at what distance range. Although, it is the volunteers' choice if they want their information to be put up on the website of SRISTI.

Also, as in [12], National Disaster Response Force of India which comes under the Ministry of Home Affairs of the Government of India, maintains records of the fire cell in various states. Also records of various areas under which the personnel have been trained are maintained.

E. Other Important Components

DMIS should provide scope for information related to response work and progress. An ideal example can be provided by [13] which is an article in The Hindu which reports the launching of the website 'www.suryahopes.in'. This is the website which was launched by the Indian Army for providing information about the rescue process during the Uttarakhand Floods of 2013. Names and location of the rescued people, helpline numbers were some records being maintained in public domain with the help of the website making it a boon for people in distress following the calamity.

According to [14], the National Emergency Management Information System-Individual Assistance (NEMIS-IA), maintained by Federal Emergency Management

Agency(FEMA), uses and maintains information like name, social security number, income, finances, FEMA disaster type, disaster related damages, contact information in a shared database to track, evaluate and provide benefits to individual disaster assistance applicants.

The examples provided above tell us about information which should be included in a good and efficient disaster management information system.

III. TECHNOLOGICAL ISSUES FOR A DMIS

Disaster Management Information Systems must use technologies which make it more useful and efficient to combat emergencies and calamities. A DMIS should be financially viable. It requires convergence of various technologies that determine how the system will function. Some pivotal things to keep in mind while designing a DMIS are :

A. Platform Independence

Designing a platform independent information system is vital for all applications, not only disaster management. A DMIS should work on all systems regardless of the operating system, location and size. DMIS should work as efficiently on a windows system as on a Mac system.

According to [15], the database used in such systems should be platform independent, obviously . Database servers like ANSI-SQL and should be preferred over MySQL as the former works for almost all operating systems as the platform-specific commands are averted.

Also datatypes supported by almost all servers are :

- double
- float
- INTEGER
- numeric
- real
- varchar
- char

B. Flexible Database Types

A Disaster Management Information Systems will require extraction from various databases. Hence, flexibility is required here.

[15] also suggests that JAVA relational databases like Pointbase or Cloudscape may be used as it is the easiest way to interconnect different applications.

Furthermore,[15] suggests that NewSQL is more flexible than relational database management systems (RDBMS).This is because NewSQL is a newer technology which provides minimal performance overhead along with better formatting options.

C. Regional Languages

This is a suggestion made in [16].Making the DMIS available to the public in regional languages will lead to a better reach and understanding of the system. As the reach will increase, the effectiveness of the system is bound to increase. This will be beneficial for armed forces, affected people and even the volunteers who come up.

IV. CONCLUSION

Disaster Management Information Systems, in the modern times, are pivotal for combating calamities. All sectors, including government and non-government, should constructing efficient information systems for disaster management. Maintaining and keeping the systems updated is also important. We should strive towards more efficient DMIS so that we can respond to disasters and be ready for them and hence, reducing the loss caused by them to a minimal level.

V. REFERENCES

- [1] (2015) Emergency Management article on wikipedia. [Online]. Available: https://en.wikipedia.org/wiki/Emergency_management
- [2] (2015) Information System article on wikipedia. [Online]. Available: https://en.wikipedia.org/wiki/Information_system
- [3] (2015) Information management in disasters. [Online]. Available: <http://www.ifrc.org/en/what-we-do/disaster-management/responding/disaster-response-system/dr-tools-and-systems/responding-to-disasters-information-management-in-disasters/>
- [4] (2015) Disaster management Information System (DMIS) on MRSAC website. [Online]. Available: <http://www.mrsac.gov.in/en/projects/software-development-project/dmis>
- [5] (2015) Flood Maps. [Online]. Available: http://www.fema.gov/media-library-data/b58ad14c2d3bbcbd26af561478a89a8c/16_maps_508_oct2012.pdf
- [6] (2015) Disaster management Information System of Solapur district/flood prone villages. [Online]. Available:

http://www.mrsac.gov.in/sites/default/files/dmis1_0.pdf

- [7] (2015) DMIS volunteer login page on IRFC website. [Online]. Available: https://www-secure.ifrc.org/DMISII/Pages/00_Home/login.aspx
- [8] (2015) The PMNRF website homepage. [Online]. Available: <https://pnmrf.gov.in/viewtransactions.php>
- [9] (2015) Amateur radio operators article on wikipedia. [Online]. Available: https://en.wikipedia.org/wiki/Amateur_radio_operator
- [10] (2015) Why HAM radio for disaster management. [Online]. Available: <http://www.vu2.in/disaster-management-emergency-communications/112-why-ham-radio-for-disaster-management.html>
- [11] Anil K Gupta (2015), "Learning to cope with disasters: We can certainly do better". [Online]. Available: http://www.sristi.org/dmis/learning_tocope
- [12] (2015) Fire cell NDRF. [Online]. Available: <http://ndrfandcd.gov.in/Cms/DATAMANAGEMENT.T.aspx>
- [13] (2015) News report: "Army launches website on Uttarakhand relief" in The Hindu dated June 26, 2013. [Online]. Available: <http://www.thehindu.com/news/national/army-launches-website-on-uttarakhand-relief/article4853352.ece>
- [14] (2015) Privacy impact assessment for National Emergency Management Information System-Individual Assistance DHS/FEMA/PIA-027. [Online]. Available: http://www.dhs.gov/xlibrary/assets/privacy/privacy_pia_fema_nemis_ia_20120629.pdf
- [15] Sanders Kaufman (2015), "Database design for platform independence." [Online]. Available: <http://www.techrepublic.com/article/database-design-for-platform-independence/>
- [16] N. Vinod Chandra Menon (2013), DMIS: issues in technology. [Online]. Available: <http://www.sristi.org/dmis/node/11>