Emergency Notification System Analysis

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Introduction

The emergency notification system enables one-way or two-way communication between emergency communication staff, first responders, and impacted individuals. Counties have suffered from various severe weather conditions from time to time, including flooding, thunderstorms, tornadoes, hurricanes, tsunamis, freezing conditions, fire, blizzards, and other climatic emergencies. There are also other human-caused emergencies such as hazardous conditions caused by chemical or gas spills, or nuclear leaks that threaten people, wildlife, and property. The County's Office of Emergency Management (OEM) is responsible for warning the affected population to minimize loss of life and property from disasters, provide emergency planning, minimize and reduce the impacts caused by the disasters through proactive prevention, mitigation, preparedness, response, and recovery [1].

This report provides detailed analysis on the emergency communication channels used to minimize and reduce the impacts of natural and human-caused disasters. The report's objective is to provide recommendations on using additional communication channels to improve reachability, enable two-way communication between OEM and County residents and to make the notifications actionable. The report aims to analyze the various existing notification systems and communication channels successfully used by other counties, understanding alerting privileges through social media, and identifying the current system limitations.

Background

Overview

Several federal and State agencies monitor the weather countrywide. The National Weather Service (NWS) is the official United States communication source for warnings during life-threatening conditions [2] and provides weather, water, climate data, forecasts, and warnings for the protection of life and property and enhancement of the national economy [3]. Although the broad regional broadcast is useful for weather updates, there are some limitations to the national and regional weather warning notifications. These include sending multiple notifications for each of the affected local communities and counties that spread over a substantial part of the country, leading to irrelevant warning notifications and redundancy. The repeated notifications cause the local population to be indifferent to the information. This complacency can cause people to neglect taking appropriate action during emergencies. Thus, it is important to make sure the warnings are sent at the right time and to the right place. Communication should encourage people to receive and heed the warnings and avoid overloading them with irrelevant and redundant warnings.

It is important for local county emergency management offices to be able to send emergency notifications to all of their population during emergencies and ensure that people can respond suitably. Because county emergency responders can provide localized warnings more quickly than the regional notification system, affected individuals can be notified quickly and in sufficient time to react to a particular hazardous

condition. Therefore, it is important for county OEMs to adopt additional channels of communication to notify a larger percentage of the population.

The report covers details on various communication channels that can be used by Howard County's OEM to improve reachability and enable two-way communication. It also includes details on marketing initiatives to improve awareness among people about the County emergency notification system and other channels of communication.

Limitations with Current System

Though the HeadsUpHoward system performs well, a large percentage of Howard County residents have not registered with the system. Some of the issues identified by the Howard County OEM official include, complacency of people due to multiple notifications, most people are unaware of the system's existence, and a lack of two-way communication.

Also, there are some limitations in using SMS for emergencies, with third party Emergency Alert Systems (EAS). Dr. Pieter Streicher of The Media Online states "cellular networks are not designed to cope with large-scale emergency traffic volumes through SMS, targeting users by location is difficult, and there is no way to authenticate a message"[4].

Methodology

Several data collection methods were used to gather information for this report. Information from online resources about emergency notification systems provided research on new mass emergency notification technologies and Geo-targeted Robocalling techniques.

Network data from social media websites like Facebook and Twitter for the Howard County OEM, Police Department, and other emergency offices were also extracted. An in-depth analysis was performed on the network data to understand the relationship between nodes, frequency, and pattern of information exchange to emphasize the need to implement additional channels of emergency communication.

An online survey asked questions about the current emergency system to understand its drawbacks and to identify areas that should be improved to achieve the desired objectives. Telephone interviews with officials in Sedgwick County, Jackson County, King County, and New York City helped understand their emergency notification systems and the additional channels of communication that can be used by the Howard County OEM.

Analysis Results

Network Data Analysis Results

The network data of Howard County OEM, Howard County Police Department, San Francisco Department of Emergency Management (SFDEM), and CDC Emergency Twitter pages were analyzed in detail. The analysis results showed that the interaction between Howard County's OEM officials and residents was very limited during the Columbia Mall shooting event [5] while the Howard County Police Department page had several interactions between residents and officials initiated by the posts.

The SFDEM and CDC Emergency pages also have multiple interactions on the page indicating a role for social media in emergency management and how it can be helpful in communicating instantly and enabling two-way communication.

Survey and Interview Results

The online survey evaluated the emergency system, provided feedback on improving the system, and was helpful in identifying the reason for low registration with the system. Only 12 percent of the respondents use HeadsUpHoward to receive emergency notifications. Of the respondents, 36 percent use social media for emergency notifications, and the rest use other sources. The survey also identified that 72 percent of respondents were not aware of HeadsUpHoward. Subscribers believe that the system is easy to use but do have security and privacy concerns.

The interview results were helpful in identifying emergency systems adopted by other counties that are successful in achieving reachability, two-way communication, and making notifications actionable. Most counties interviewed use a primary emergency notification system such as Everbridge, AlertSense, and Emergency Communications Network (ECN). The counties also use additional channels of communication such as Facebook, Twitter, Twitter Alerts, Mobile Applications, IPAWS, and Geo-Targeted Robocalling, or reverse 911 calls. The counties also use several methods to publicize their emergency notification systems to increase the reachability of the system through social media advertising, distributing pamphlets, cross promoting, etc.

Research Analysis Results

The online research was helpful in exploring various other channels of communication such as IPAWS, Geo-Targeted Robocalling, and Mobile Applications that can be used to reach most of the county population that either owns a smartphone, internet connection, or a land line.

Recommendations

Recommendations based on network data analysis

- Twitter Alerts for emergency communication
- Facebook Page for emergency management
- Twitter Page for emergency management

Marketing and advertising recommendations

- Facebook Advertisements
- Facebook Call-to-Action Buttons
- YouTube for Government
- YouTube Advertisements
- Google AdWords
- Widgets

Recommendations based on survey and interview results

- Mobile Phone Applications
- Geo-Fencing

Recommendations for increasing awareness and reachability

- Hashtags
- Cross promoting within partnering organizations
- Connections with partners
- Proactively invite web visitors
- Enable use of social media login

Limitations

The proposed recommendations assume that most of Howard County's population has access to one or more social media channels, access to an internet connection, or access to a telephone or cellular smartphone. The research methods used for this report include interviews, online surveys, and network data analysis. The online survey results may not be truly representative of the population because the respondents are from a convenient sample and the sample size is very small. The recommendations provided based on the interview results are limited to only a few counties that were interviewed during the project. The network data extracted to perform the analysis was limited to only 20,000 tweets for Twitter and Facebook data for two days, and because it is based on limited network data, may not be representative of the actual performance of the social media page.

Challenges and Successes

Challenges

The challenges faced during the project include allocating time to schedule the telephone interviews with counties emergency offices. It was challenging to have people respond to the online survey posted through social media channels and randomly selected people from Howard County.

Successes

With limited dependency on client and other external sources for gathering information and performing the task, the milestones were met on time. The Howard County OEM was helpful in approving the methodology used in the analysis report; they also assisted by posting the survey questions on their Facebook page.

The telephone interviews were successfully conducted with Sedgwick County, King County, and the New York City emergency management officials within the deadline.

Conclusion

Overall, social media offers emergency managers a unique set of tools to engage with the public before, during, and after an emergency. Though these technologies and the knowledge of how to use them continue to improve, previous applications have been quite successful.

Continued research will possibly produce new tools as well as techniques to adapt existing social media tools to their fullest capability. Similarly, the IPAWS system is useful for sending push notifications to targeted areas, but it cannot be used as the primary source of information during emergencies. Social media channels, IPAWS, and Geo-targeted Robocalling can be used as ancillary channels of communication to achieve reachability, allow two-way communication, make notifications actionable, and measure their effectiveness.

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