

An Online Social Network for Emergency Management

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ABSTRACT

Online Social Networking Sites (SNS) are becoming extremely popular and can be employed in a variety of contexts. They permit the establishment of global relationships that are domain related or can be based on some general need shared by the participants. Emergency domain related websites, each with their own stated mission, are becoming widespread. Can a social network offer a solution to bringing emergency domain-related entities together as a ‘one stop shop?’ We propose to investigate whether the social network paradigm can be used to enable individuals and organizations to collaborate in mutually beneficial ways, in all stages of emergency management: mitigation, preparedness, response and recovery. Emergency management students were surveyed to examine the concept of social networks and their acceptance as a potential tool. The results of this exploratory research show overwhelming agreement that SNS should be considered a viable solution to the problems plaguing information dissemination and communications in the emergency domain.

Keywords

social networks, emergency, collaboration, collective intelligence, online communities

INTRODUCTION

The Web2.0 environment is making mass collaboration easier. The use of Social Networking Sites (SNS) shows considerable promise for more efficient and effective communications in the emergency field (White, Turoff and Van de Walle, 2007a; White, Plotnick, Turoff and Hiltz, 2007b; Benbunan-Fich and Koufaris, 2007; White, Plotnick, Adams-Moring, Turoff and Hiltz, 2008a; White Hiltz and Turoff, 2008b; Turoff, Hiltz, White, Plotnick, Hendela, and Xiang, 2008). Garton, Haythornthwaite, and Wellman (1997) describe a social network as “a set of people (or organizations or other social entities) connected by a set of social relationships, such as friendship, co-working or information exchange” (Garton, et al, 1997, p.2). SNS are being used for myriad reasons and are rising quickly in popularity and in number (Vieweg, Palen, Liuk, Hughes and Sutton, 2007).

Organizations use social networks as a way for members to reach out to one another and collaborate. Our research focuses on the use of SNS for mass collaboration during both expected emergency situations as well as extreme events (Turoff, White and Plotnick, 2007). It’s not surprising that social networks are predicted to be used more by online emergency communities (Viewig, et al, 2007).

“It’s sharing and connecting in a time of crisis when it matters the most” (news.smh.com.au, 2008, p. 2).

SNS can be best leveraged during time critical response efforts if most participants have already built a history and trust (Altschuller and Benbunan-Fich, 2008). The Department of Homeland Security (DHS) has noted the potential of social networks and expressed a desire to better understand how they could be used in disasters (news.smh.com.au, 2008). Social media such as social networks also can be used for “wide-scale interaction that can be collectively resourceful, self-policing, and generative of information that is otherwise hard to obtain” (Sutton, Palen, Shklovski, 2007, p. 1). Hemanshu Nigam, MySpace chief security officer and a former US federal prosecutor, envisions social networks as an online platform for the digital age where firms can interact during unfolding crisis situations (news.smh.com.au, 2008).

A broad definition of SNS is: “Web-based services that allow individuals to:

- (1) Construct a public or semi-public profile within a bounded system;
- (2) Articulate a list of other users with whom they share a connection; and,
- (3) View and traverse their list of connections and those made by others within the system. The nature and nomenclature of these connections may vary from site to site (boyd and Ellison, 2008, p. 211).”

For our purposes, we characterize a social network as links from people to other people, groups or information objects. Such objects may be messages, photos, videos, wall postings,¹ notifications, current activities, events, widgets², etc. Such links might be created by intelligent agents or by the users. A social network that allows the flexibility to be used in both preparing for and responding to emergencies will need sufficient intelligence to allow the dynamic linkages of individuals to the circumstances that they are involved with or should be involved with. Otherwise the time urgency of the situations will quickly result in information overload (Hiltz and Turoff, 1985, Turoff and Hiltz, 2008, 2009).

An emergency domain social network is not envisioned to replace extant organizations. Rather, it would be a common ground meeting place for organizations and people to come together to share information and find potential collaborators with needed expertise. However, before embarking on the design of such a social network, it is prudent to examine critically current social networking sites and how the emergency domain is presently using them. Also, it is essential to engage emergency management personnel and their organizations in dialogue to determine their needs, and how to best serve them. Therefore, in this paper we outline a research plan to ascertain what design considerations would best suit this domain.

The remainder of this paper is organized as follows: Social Networks and their present usage within the emergency domain are reviewed. This is followed by research questions generated from the literature review and interviews. Next, the research methodology is described. Results from the pilot study are presented and discussed, followed by a conclusion describing the ongoing evolution of social networks. Last, the next steps are described for this ongoing research.

SOCIAL NETWORKS AND EMERGENCY MANAGEMENT

The first generation of the Internet was centered on personal and organizational web sites where individuals sought information. Web2.0 provides technology to support mass collaboration. Wikis, blogs, forums and Social Networks are all used, especially by the NetGen³ population of younger adults (Tapscott and Williams, 2006).

Emergency groups are being created in some of the more popular SNSs. Facebook alone supports numerous emergency related organizations such as Information Systems for Crisis Response and Management (ISCRAM), The Humanitarian Free and Open Source Software (hFOSS) Project, Arkansas Tech University Department of Emergency Administration and Management, and Emergency Awareness at the University of Maryland (Facebook). A number of groups also recently have been established on LinkedIn to facilitate the exchange of planning and exercise techniques and information. A search of LinkedIn using the keyword ‘emergency’ retrieved 163 groups (October 31, 2008). Emergency groups representing various stakeholders from all over the world are represented. Some of these included groups named: Emergency Management and Homeland Security Officials, Professionals in Emergency Management, American College of Emergency Physicians (ACEP), and Firefighter, Rescue & EMS Network. Some groups also have subgroups of local or specialized chapters. For

¹ A wall posting is a public communication, like a blog, associated with a SNS individual member or group.

² A web widget is a portable chunk of code that can be installed and executed within any separate HTML-based web page by an end user without requiring additional compilation.

³ NetGen is a group who grew up with digital technology, the Network Generation.

example, there is both the International Association of Emergency Managers (IAEM), and IAEM EUROPA, which is for members of the IAEM Europa Council.

Other groups such as Community Emergency Response Teams (CERT) have US affiliations as well as smaller chapters like the Austin/Travis County CERT which focus on narrower topics. There were 8 distinct CERT groups identified on LinkedIn. Sutton et al. (2007) argue that past examples of the emergent uses of social media are indicators of how disasters will be managed by society in the future. Although social networks are being used by emergency groups, they are barely tapping into the capabilities that a SNS can provide -- a social network solely designated for emergency mitigation, preparedness, response and recovery.

Present SNS Use in the Emergency Domain

The Sydney Morning Herald in Australia reported that as Hurricane Gustav approached the Louisiana border, DHS officials reached out to MySpace and requested a fast-track disaster notification system. MySpace developed a 'widget' that

- Links profile pages to federal information including finding dislocated victims
- Aids affected areas
- Provides an online tracking system for users

This system was a natural for MySpace because the social network already provided much of the functionality needed: sharing pictures, videos, stories, fast online access to contacts and loved ones (news.smh.com.au, 2008, Chapman, 2008). This was one way evacuated Louisiana residents kept family members updated as to their whereabouts. Another benefit is that an online system reduces the load on the phone system during emergencies (Schneiderman and Preece, 2007; White, Hiltz and Turoff, 2008b).

Social Networks as Notification Systems

Social Networks lend themselves to providing a wide variety of capabilities such as having a mass notification system. "...the thought of creating an emergency alert system for the digital world." (news.smh.com.au, 2008, p. 2). A CERT group in Arkansas needed immediate volunteers to handle the large number of incoming evacuees from neighboring Louisiana after Hurricane Gustav. The usual notification system was a call list which had worked in the past successfully. However, it was 5 a.m. in the morning and people were not answering their phones. Next, an attempt was made to send an e-mail to notify the members. But, this system was down. So, in desperation and as an unplanned alternative, the group turned to their existing Facebook group. First they used email to a mass e-mail distribution list of organization members and then the CERT official placed a 'status message' by her name in Facebook for those who went to Facebook, even if the member did not visit organization's page. A status message is a snippet (only a sentence or two) of information describing what the member claims s/he is doing at the moment. In Facebook, it is located right by the member's profile image and is seen on other user's login pages. Every time someone updates his or her 'status', others are immediately notified on their personal page. It is a good strategic place to put information when the information is intended to be read by all of the group members.

A university emergency department's group on Facebook uses this "wall" as a way to notify students of ongoing events. Walls were also used in Facebook by students at Virginia Tech after the tragic shootings on campus as a means of listing the names of the deceased. "'Walls' are a means of public messaging, and they exist both as personal walls—accessible by profiles—and 'group walls.' Groups enable people with similar interests to come together; they can be created by anyone about any topic. Within groups, Facebook supports discussion and photo threads, providing multiple ways to communicate" (Vieweg, et al, 2007, p. 2).

MySpace is already being used as a notification system with 'Amber Alerts' (news.smh.com.au). These are alerts in the United States to help quickly identify and locate missing children who may have been abducted.

SNS in Recovery Efforts

911ICE.org uses social media for information dissemination. Newer mobile phones have a special contact. In Case of Emergency (ICE) has a trigger with a highly contextualized presence ("I've been hurt"). The model is:

1. Tragedy strikes and 911 responders activate the "In Case of Emergency" (ICE) feature in your mobile phone.
2. 911ICE.org alerts a list of people from your mobile's address book.
3. It connects your emergency network and drives them to a web page created for the emergency event. They can chat, email, and text updates to each other live.

4. Along the way, 911ICE.org shares links to your Google Health or Microsoft HealthVault medical profiles with the emergency room and first responders” (Wolf, 2008, p.1).

During the recovery phase, 911ICE.org distributes the following information:

- Micro-community triggered by a common event
- Different stakeholders (friends vs. doctors) see different information
- Multiple communication modes reach different people

This demonstrates how personal information can be categorized and further utilized where needed.

Social Networks for Emergency Information Gathering

In their essay about a community response grid called 911.gov, Schneiderman and Preece (2007) refer to the millions of users of social networking sites as justification for advocating the practicality of this approach for citizen involvement in emergency management. As they envision it, the system would bring users to a helpful, user-centered Community Response Grid with local information and clear choices about what to do next. It would allow residents to report and receive information about emergent events such as fires, floods, tornados, hurricanes, community health concerns, and terrorist attacks. Residents could use Web-enabled computers and mobile devices, as well as cell phones to provide text messages, photos, or videos, as a means of sending and receiving the information or requesting assistance. These inputs would be shared not only with community officials, but also with other citizens. Including SNS-like profiles could help to verify the “credentials” of the reporting users, and the use of groups within such a system, e.g., neighborhood and community groups, would help to filter the information according to locale.

Social Networks Building an Information Repository

Besides contributing information or inquiries to such a site, the public can also help to organize the information on the web by using “social bookmarking” systems that develop a set of “tags” or labels and thus enable sharing of “pointers” to URLs containing information on a topic. As pointed out by Benbunan-Fich and Koufaris (2007), some online Internet “bookmark” sharing sites allow users to organize and filter aggregated content with user-generated meta-information. In Flickr, for example, users can tag (provide key words or labels for) photos posted by themselves and others. Users can share some or all of their contributions with other users of the system, thereby creating a *social* bookmarking system.

RESEARCH QUESTIONS

Our overarching research question is, “Can a social networking site, developed specifically to meet the needs of the emergency domain, be useful and effective for large groups of collaborating emergency professionals and volunteers?” Related questions, derived from preliminary examinations of the literature and social networking sites are:

1. Given a tool that allows for ascertaining group skills and availability, would emergency groups use such a tool to dynamically form a social network for collaboration in a new situation? People as resources or the conveyers of resources are not explicit in the current social network systems.
2. Would emergency groups also use such a tool on a regular basis so as to reach out and build a larger network or build a specialized network of experts for emergency planning and response (Turoff, Chumer, Van de Walle, Yao, 2004)?
3. Are there impediments to emergency groups using such tools such as administrative policies or fear of raiding of human resources by other groups? There is organizational resistance to speaking publicly about problems lest the organization be viewed negatively by the public.
4. How beneficial would a social network be in a local geographical area and how do we integrate geographical information system (GIS) type information both for planning and dynamic response (Baumgart, Bass, Philips, and Kloesel, 2007)?
5. How do we improve time urgent situations and allow dynamic integration of small user groups with the ongoing problems they should be aware of without creating more information overload or stress for those involved (White, Turoff, and Van de Walle, 2007)?

METHODOLOGY

Action Research

According to Hult and Lennung (1980, p. 242): action research simultaneously assists in practical problem-solving and expands scientific knowledge. It is performed collaboratively (with members of the organization or group being studied) in an immediate situation using data feedback in a cyclical process aiming at an increased understanding of a given social situation. We propose that a variant of action research, aimed at feedback to social network members rather than to the “traditional” single organization used in action research, is appropriate for the development of emergency social network design principles and prototype site. Action research typically follows multiple cycles of a five-phase process: diagnosing, planning, action, evaluation, and lessons learned (DeLuca, Gallivan and Kock, 2008). These five phases are overlapping and iterative. Each phase we propose will involve practitioners and the researchers/developers in the process, thus promoting an appropriate solution set to support the needs of those who can benefit from using it.

Within each phase of our plan, the process of diagnosing, action, evaluation, and using the lessons learned to refine the product of the phase or inform the next phase will be used. For example, as we interview practitioners to develop our research questions, we will be diagnosing the needs of the practitioners, planning the survey to follow, evaluating our results as we gather more data, and using the results to inform the questioning route of additional interviews and the survey that will be prepared for a wider sample of emergency personnel. The planned phases of this research are:

Phase I: Diagnosing

Defining the problem commences with a literature review and an examination of a variety of current social networking sites. The goal is to understand the current state of social networking sites and the state-of-the-art of the technology.

Phase II:

Semi-structured interviews will be carried out by two of the researchers, using an interview guide. The goal is to further define the problem in terms of the needs of organizations and emergency personnel, refine research questions, and to develop a survey that can be administered to a larger sample of emergency personnel in a variety of organizations. This step will be completed iteratively with the interview guide updated as themes arise.

Phase III:

A survey will be developed based upon the data obtained from the interviews and research questions. The web-based survey will be administered to a large sample ($N > 200$) of emergency personnel in a variety of organizations and roles.

Phase IV:

Data obtained from the surveys will be analyzed and an initial set of design principles will be developed. Current plans call for a select group of emergency experts to help refine the design principles.

Phase V:

Plans for prototyping a social network site using the design principles that result from Phase IV activities include working with experts to test and refine the prototype.

This paper reports on Phase I and the first studies in Phases II and III.

Subjects and Procedures

Initially, a convenience sample of nine graduate and undergraduate students was interviewed. The responses were saved by audio on Audacity. We listened to the recording repeatedly, gathering responses and coding themes to discover patterns using content analysis. Using this information, a formal survey was designed. This survey, posted on QuestionPro® was used to confirm the information that we had gathered.

An email with the link to the survey was sent to emergency domain students and teachers in the US and UK. The email was sent first to four instructors in the emergency domain who then forwarded it to other instructors who were teaching relevant classes. Therefore, we do not know how many recipients of the email there were, but 104 email recipients viewed the survey, 80 started the survey and 72 finished, giving a 90% completion rate. Not all questions were answered by all participants; percentages are based on the numbers of participating members. Every question had at least 70 responses. All respondents knew what a SNS was and 94% were members of at least one SNS. 86% were members of Facebook and 42% had used YouTube.

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J. Landgren and S. Jul, eds.

Examination of Extant Social Networks

Four social networks were examined in depth. The number of hits, how the site was supported/funded, whether there were advertisements on the site, and characteristics of the users (i.e., the target market) were all examined. An interesting observation was that MySpace had an amazing 72 million hits per month. Facebook was also used with great frequency with 34 million and a lesser known social network, Bebo, had 22 million hits per month. Functionality was included with the goal of meeting the needs of the target market. For example MySpace functionality is built around the member's personal information while Facebook is more focused on interacting with others and 'ties' to other friends and groups. LinkedIn is targeted to professionals networking with others to create business relationships.

RESULTS AND DISCUSSION

All of the respondents agreed that SNSs would be beneficial to those in the emergency domain. The respondents listed many potential uses for an emergency domain SNS such as:

- Great way for fast, cheap mass distribution of communications
 - Announcements
 - Emergency notifications
 - Best Practices
 - Lessons learned
- Stimulate research and share ideas
- Enhanced Networking and Mass Communication
- Free and easy
- Educate Public through Awareness Presentations: How- to Videos, etc.
- E911 – Reverse 911 Strategies
- Coordinating and managing response and recovery efforts
- Job announcements and postings (LinkedIn characteristics)

The subjects frequently noted the need for a centrally located site with resources and a common ground for the emergency domain.

“information to be pooled in one common place for emergency management to look up specific topics and expand their knowledge; centralizing the location of resources making them accessible; to archive information concerning all aspects of emergencies creating a repository of literature.”

When asked what an online social network would be good for where respondents could select from among a list of features, the outcome was as shown in figure 1:

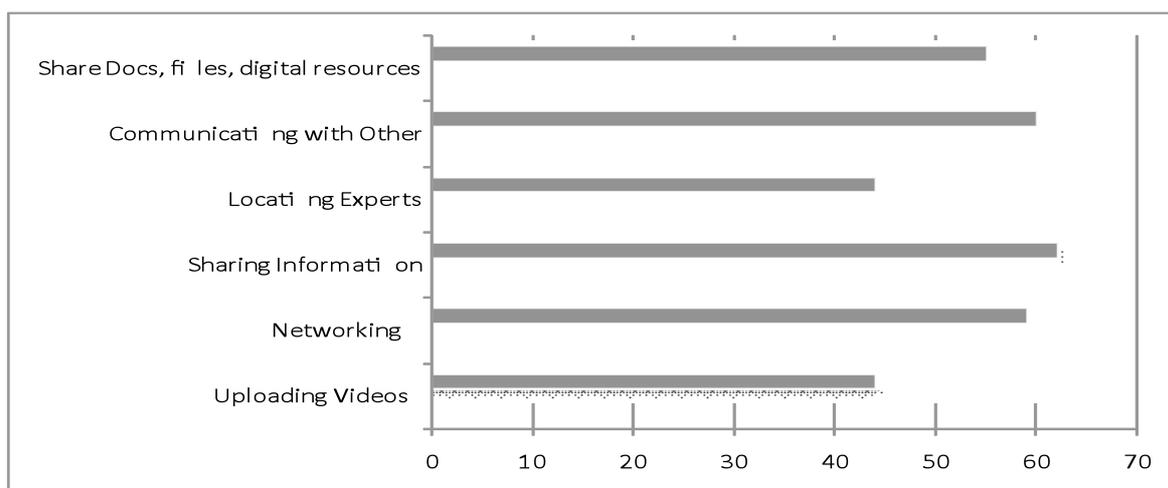


Figure 1 Uses of SNS for Emergency Management

Subjects also concurred that having the ability to upload pictures and video would be advantageous. Not only would this provide information to the trained eye, but also could be utilized later in *lessons learned*. Also, *best*

practices could be listed such that emergency officials could compare and contrast how things are done by other organizations/departments and learn from one another.

However, concerns were also mentioned including the threat of technology failure, hackers, stalkers, viruses, flaming, usability issues, uncertainty of information quality and information overload. Some concerns were raised about the credibility of resources. There are recent studies indicating the level of accuracy is high from online mass collaboration during crisis. Vieweg, et al. (2008) found:

“For the inductively-derived issue of distributed problem-solving in times of disaster, the research objective is showing that the phenomenon of collective intelligence does, in fact, exist, and can exist in a directed fashion around focused tasks with self—regulated and accurate results. Furthermore, the phenomenon runs counter to popular mythology around disaster behavior of civic post-disaster engagement as hysterical, prone to error and even dangerous – a view that pervades current disaster management policy and technological orientations” (Vieweg, et al, 2008 p. 46).

Other concerns were about having the time available to keep up with the forums (information overload) and the availability of the system. They questioned if the system would be available when it was needed. These are credible concerns in that they are dependant on the type of situation encountered. The Internet or the electricity needed to power the equipment may be unavailable after an earthquake, flood or explosion. However, if this were a social network, users would be geographically dispersed and the web would still be functional in areas where there was no damage. Through the use of electronic media, dispersed experts can still be useful in an emergency even if they need to travel to the locale or stay distant but communicate electronically with solutions and suggestions.

But, far more benefits were disclosed than concerns. Ideas generated generally focused on new uses for current SNS functionality such as having chat available 24/7 to function as an interactive 911 dispatcher. One respondent noted that the chat feature is already in use by the National Weather Service. “They have a chat set up with other forecasters, the news, etc, which I think can be used in the same way through an emergency management channel.” Many suggested a mentoring program for those new to a field or who may want support. Since the respondents were primarily students, this suggests that there may be a need for mentoring of students and novices in the field; a need that an emergency SNS can address. Others noted that allowing information to be exchanged from different countries such that one country can help another in response efforts would be beneficial.

“different people from different places could work together and share information.”

One primary problem with an emergency is that the people in charge must interact on an ongoing basis with the media giving updates. This is very time consuming and means that everyone in charge has to be somewhere at one time and devote this time when other responsibilities that may be critical await their attention. Using a SNS to post videos and announcements to update the public would be more time and cost efficient than using traditional media outlets. Finally, ad-hoc group formation, the collaboration of experts from different agencies and the ability in general to have cross-agency communications were also seen as advantages of using SNS in the emergency domain. Subjects were particularly interested in finding experts in the field, especially when the need is immediate. Matching specialty skills to help quickly identify and locate those who would be most useful to handle the exigencies of the moment was seen as vitally important. Thus, the SNS was seen as beneficial during an emergency as well as in preparation for and in response to it.

CONCLUSION

Preliminary results indicate that a Social Network dedicated solely to the emergency domain would be accepted as a vital asset. Expert identification, resource aggregation and availability, and mass collaboration were some of the key capabilities important to the interview respondents. However, as younger people are more likely to use such a system to its fullest capability, the acceptance of a social networking site devoted to the emergency domain may take time as the emergency domain becomes more populated with younger professionals. Educational programs, however, may ameliorate this problem so it is prudent to continue research and development of an emergency domain social network.

We should not forget, however, that the current generation of social networking sites was developed for the primary objective of socializing which is a very important component for groups working online collaboratively (Hiltz and Turoff, 1978, 1993). They are not designed currently to incorporate tools that allow the users to

collaborate on issues and problems associated with their professions. The current software does not yet meet some of the more obvious requirements for communities of practice such as those in emergency preparedness and management (White, et al, 2007b; Turoff and Hiltz, 2009; Turoff, et al, 2008). Furthermore, the competition among the current generation of social networking systems means that they attempt to capture the user into one system and this makes it difficult for individuals to integrate their activities in different systems. It is very likely a new generation of software products will cater to the professional associations as sponsors and operators of professional social networks. In any case, the systems we see today will seem primitive in five years, once mature user requirements emerge for true collaboration and recommending processes under complete user control (Turoff and Hiltz, 2008).

FUTURE RESEARCH

Additional studies will be made surveying crisis response information systems analysts for further insight into ways of leveraging a SNS. Further surveys will be created to gather information from professionals in the emergency domain (Phase III). The data from those surveys will be analyzed and the results will be used in collaboration with emergency experts to develop design a solution set for an emergency centric social networking application (Phase IV). This will be all be used in prototyping such an application to be developed and testing it with emergency experts (Phase V).

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