Social Media: Are There Differences Between First Responders and Citizens Contributing to Emergency Management Responsiveness Using Social Media?

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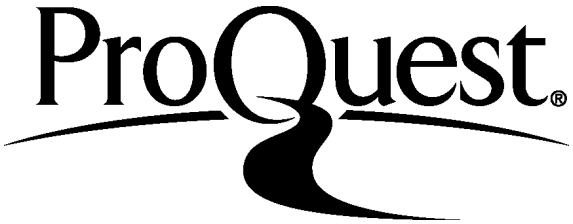

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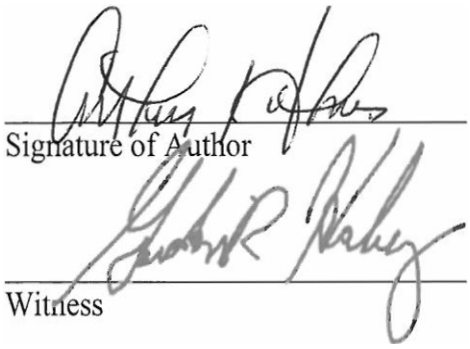

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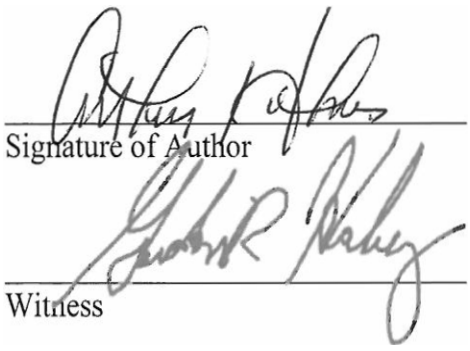

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Abstract

Studies have been done on the role social media plays in the preparedness, mitigation, deployment, and recovery effort from a major disaster. This study examines whether or not there were differences between first responders and citizens contributing to emergency management responsiveness using social media in disaster preparedness, mitigation response, and recovery efforts in Miami-Dade, Broward, West Palm Beach, and Monroe Counties. The problem addressed in this study, although many emergency management agencies use social media during disasters, the knowledge, type, usage, behaviors, and impact and whether or not the public and first responders collectively will support a two-way social media communication system is unknown. The purpose of this research is to investigate and contribute to current research to gain an understanding of whether citizens and first responders will participate in using social media before, during and after a disaster. The social network theoretical framework was used for this study. This theory attempts to identify and clarify the impact on and to social media use during a disaster as well as the actions of individuals, type of social media uses, ties, linkage, and behavior of various social media groups. This research data shows that there were no differences between first responders and citizens contributing to emergency management responsiveness using social media.

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And above all, thanks to my family for the love and support that they gave throughout my journey. Words cannot express how grateful I am. I want to give special recognition to my wife Luticha, who stood by me with love and inspiration believing in me through it all. And thank you to my daughters, Shaquellia and Malana for loving me regardless and being my second pairs of eyes.

Dedication

To my children, Arthur Holmes, Jr., Travis Holmes, Shaquellia Holmes, and Malana Gordon, you all were my inspirations, to my wife, Luticha Holmes, thank you for your patience, temperance and support that kept me grounded during the time that it seemed that this journey became too demanding to endure. Thanks to my grand-aunt, Diane Woods, despite the pain and suffering growing up in the deep-south, you never gave up on me. I would never forget the sacrifices you made so that I could become the person that I am today. Thank you for teaching me values, morals, and judgment to live with the understanding that a person never stops learning. All though you are no longer with us now, I hope that I have made you proud. You and God are the reasons for my success. This is dedicated to you.

To my pastor, teachers, friends, and students who entered my life along the way, I thank all of you for the support and encouragement that kept me focused and balanced. For that brief moment, you made a difference. I hope and pray that I can give as much in return.

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Chapter 1: Introduction

According to the National Science and Technology Council, "a disaster is the disruption of community functions that causes lost to human, material, economic or environmental activities that exceed a community's ability to use its own resources" (National Science and Technology Council, 2005, p. 21). Regularly, there is a hurricane, typhoon, floods, earthquake, tornado, storm, virus epidemic or other disasters that require major emergency response to the incident. When a major disaster strikes, social media is becoming the communication tool of choice in emergency management's disaster mitigation, preparedness, response, and recovery efforts. Research conducted by a number of researchers suggested that more insight is needed in the use of social media in disaster management. Studies show that social media is becoming the communication tool of choice for citizens in disasters (Department of Homeland Security, 2013; Chan, 2013; Downing, Ford, Gil, Stein, & Hackett, 2002; Hughes, Palen & Peterson, 2013 Keim & Noji, 2011; Lindsey, 2011); Olteanu, Viewg, & Castillo, 2015; Sarcevic et al., 2012). However, according to Su, Wardell, and Thorkildsen (2012), much of the data on social media and emergency management use is limited to anecdotal accounts and case studies because little research has been done to understand first responders and citizens' interaction on social media before, during and after a disaster.

Hughes, Palen, and Peterson, (2013) state that social media has opened the discussion around two-way social media communication between citizens and public safety officials before, during, and after a disaster in providing information and assistances. While Lindsey (2011) and Baruah (2012) add that social media have the

potential to change the characteristic of social lives interpersonally and at the community level. One reason is the interaction they can have through the various attractions that lie in the connections between people that social media affords.

Theil and Jennings (2012) state that emergency management is a managerial function design to create a framework approach involving planning, informing, coordinating, training, and exercising for a variety of unforeseen and predictable disasters that may occur in a community. They suggest that there are a variety of activities that needs to take place in dealing with disasters to ensure community readiness which includes providing information and support before a disaster occur.

Social media are digital interactive tools that users can generate to manipulate or influence dialogue and content exchange among consumers and creators (Starbird & Palin, 2011). It is a new communication medium that was once used for entertainment operating on various Web and mobile based devices. Baruah (2012) and Lindsey (2011) add that social media is composed of Internet based applications such as blogs, discussion forums, chat rooms, Facebook, MySpace, Twitter, and LinkedIn which have become widespread and can serve a variety of purposes. Using social networking sites, individuals are able to share details of their condition, coordinate activities, and exchange information with friends, families, and others in ways previously accomplished only in person (Hughes, Palen, & Peterson, 2013). For this study, the five major social media used in past major disasters to date are considered because many users can access them through their portable or hand held devices.

Chan (2013) states there are five key characteristics of social media that should be considered in a disaster which are collectivity, connectedness, completeness, clarity, and collaboration, which are needed to support incident management functions. He adds that it is essential to consider how social media applications can be incorporated into an integrated disaster and crisis management platform. This leveraging of social media technologies for disaster management provides citizens with a greater role in preparing for and managing crises and disasters. Goldfine (2011) adds that for any organization to achieve effectiveness through social media that they should use the most utilized and popular site to reach and establish contact with the public.

Some emergency managers, public safety officials, governmental agencies, and first responders are beginning to use social media in their preparation, mitigation, response, and recovery efforts at the national, state, and local level. Skarda (2011) states that the Federal Emergency Management Agency (FEMA), Department of Homeland Security (DHS), and Federal Communications Commission (FCC) have implemented various social informational strategies into their emergency-management plans in responding to disasters and providing public safety needs. Lindsey (2011) adds that FEMA and FCC have implemented a Personal Localized Alerting Network (PLAN) which alerts the public over television, radio, and mobile phones. However, some concerns to emergency services officials is in determining why people use different social media sites, the social impacts and benefits to and for people using social media as a communication system during disasters.

Downing et al. (2002) state that social media engages and empowers social media audiences, not just as consumers but as citizens. It is a two-way interactive communication system that can provide real time data and pictures from almost anywhere. Fraustino, Liu, and Jin (2012) add that people use social media for various reasons, which include (a) convenience, (b) seeking timely and unique information, (c) self-mobilization, and to maintain a sense of community, and (d) to seek emotional support and healing. According to Skarda (2011) and Hughes, Palen, and Peterson (2013) social media can be used in several ways during a disaster which include (a) sharing information and spreading awareness, (b) assisting in relief operations, (c) establish a communities of volunteers, helpers, and (d) for collecting funds, monitoring, and providing insights of the total disaster situation. Fraustino, Liu, and Jin (2012) conclude that research is showing that a large number of citizens are relying on social media to receive information and assistance before, during and after a disaster strike.

Hughes, Palen, and Peterson (2013) state these technologies have challenged the one-way model of communication by mass media by allowing the public to participate in emergency response in a new and unexpected ways. Smith (2012) adds that the mass media (e.g., newspaper, television, radio) is a one-way communicator that does not provides instant feedback, as do social media, which have two-way communication capabilities. They contend that emergency management agencies that operate as command-and-control organizations, push information to members of the public with too few mechanisms to support communication flow back. These new communication

technological developments are placing pressure on emergency managers and public safety officials to release information over social media streams, monitor online activities during an emergency event, incorporate information provided by members of the public into response efforts, and engage in the public conversation around the event.

The Department of Homeland Security (2013) finds that governments, emergency and crisis managers, disaster preparers, emergency responders, law enforcement, and other agencies must take into consideration and understanding the factors and dynamics affecting the way information is provided, received, and used by citizens in crisis and disaster situations. Lindsey (2011) and Carfago (2014) suggest that emergency managers and others have to make sense of and respond to disasters and crises because of the changes in the way the public relies on social media for their news and information. These changes are due to social media and the type, speed, and volume of data, as well as the constantly evolving technologies now accessible to the public during disasters.

Chan (2013) notes that the emphasis moving forward should be to explore how emergency managers and public safety officials can foster better community engagement before the onset of a disaster, tapping into its knowledge base and potential, capabilities to improve responses. He adds that this create an interest in the public safety and emergency services area due to this possible communication paradigm shift in the way information is delivered and received to and from the public before, during and after a disaster. Liu, Palen, Sutton, Hughes, and Vieweg, (2008) suggest the study of crisis

informatics may reveal how the public and emergency managers can interact in exchanging information during a disaster.

Background

Over the past 10 years, there have been several natural disasters—the tsunami in Indonesia in 2004, Hurricane Katrina in 2005 in New Orleans, earthquakes in Haiti in 2010, the earthquake and tsunami in Japan in 2011, and Hurricane Sandy in 2012 in New Jersey—in which social media has played a greater role in disseminating and receiving information and which allowed the public to have a two way conversation with volunteers, public safety, and government officials in requesting assistance and support (Hughes, Palen, & Peterson, 2013). Emergency managers and responders used the information they received to channel resources and focus their relief efforts to the most affected areas. The goal of an emergency management operation is to provide the greatest amount information, assistance, and support to citizens during a disaster (Baruah, 2012). However, much of the information shared was due to hand held devices such as telephones, iPad, laptops, and others.

A study conducted by Lindsey (2011) suggests that there are two ways in which social media can be used for emergencies and disasters, which includes dissemination of information and receiving user feedback. He concludes that another use of social media, in a systematic way, is using the medium to conduct emergency communication, issuing warnings, and receiving victim requests for assistance. Social media may also be used to

monitor user activities and posting to establish situational awareness and upload user images to create damage estimate and deployment of needed resources.

Maron (2013) adds that the new playbook will not do away with traditional news providers; the emergency broadcast system or other governmental efforts. It will include new data from researchers, federal agencies, and nonprofit organizations that may reveal the exact penetration of social media in disasters and support modem for the community. This will enable uniform dissemination of information, responses, and incorporate a better understanding of feedback from the public.

Hager (2013) adds that Hurricane Sandy disaster generated 20 million tweets in a single week. In December 2012, when Typhoon Pablo struck the Philippines, there were 20,000 tweets in 10 hours. According to another report, Twitter usage in Japan increased to 11,000 tweets per minute on the day of Fukushima Quake in April 2011. With this amount of communication, many governments, organizations, and emergency responders became overwhelmed and did not understand how to filter the vast amount of information they received.

Brooks (2014) concludes that the future of disaster response lies in private-public partnership in which government and private businesses join forces to create one centralized platform connecting all the Web and mobile-based tools during disasters. Social media is beginning to be the primary ways information is shared in society. Brooks added that there are gaps in using social media during disasters such as the lack of machine-readable data. When data are not received in open formats, many

steps are required to share it, and extra steps can keep critical information from getting to the public in a timely manner.

Lindsey (2011) argues that the cost to launch and maintain a social media program is unclear when considering the number of personnel required monitoring social media activities, the length of time in use, and the need to respond to each public request and concern. However, various individual systems linking social media platforms are in existence. Systems such as Ushahidi, which used during the Haiti earthquake and used during the Japan earthquake and tsunami, and Twitter, Flickr, Google, as well as Facebook have modified their system to collect information, pictures, and locate people in conjunction with these systems.

Statement of the Problem

Palen et al. (2011), Yasim (2010), Baruah (2012), Fraustino , Liu, and Jin (2012), Department of Homeland Security (2012), and Hughes, et al., (2012), suggest social media can become a two-way communication tool before, during and after a disaster. However, they conclude that gaps remain in the understanding of the role social media plays in disasters such as: (a) which functions of social media are important, (b) whether or not there are differences in human behavior during various disasters, (c) how group or individual influences play a role, (d) what is the cause-and-effect of social media, and (e) is there a difference between social media and traditional media communication (Lindsey, 2011)?

The problem addressed here is although social media is becoming an effective communication tool in disaster management, there seems to be some disparity and misunderstanding among citizens', first responders', and emergency management's intended use and expectations. The key question, during the literature review, are their differences between first responders' and citizens' understanding and contribution to emergency management responsiveness using social media during disasters? There may be a need to provide clarity and distinction between what is considered the emergency management role and responsibilities as well as what is considered disaster management role and responsibilities. Martini (2014) contends that if a system for embedding social media within the current Incident Command System, it is a way citizens can play an important role in aiding first responders and emergency managers in situational awareness during disasters.

In a survey conducted by Su, Wardell, and Thorkildsen (2012) on the use of social media in the emergency management field, the authors suggest that a significant number of state, county, and local emergency agencies are using some form of social media in their communities. However, the problem is that there are limited studies on the use of social media by first responders and citizens in the two-way information exchange process that can contribute to emergency management responsiveness. They claim that technology was used in an as needed fashion with minor efforts from a dedicated social media team. Another barrier may be the lack of first responder participation from the operational perspective.

This research examines the attitudes of citizens and first responders toward their role, responsibility, and skills regarding their participation and contributing to various phases of emergency management efforts. However, the understanding as to how citizens and first responder's feel about two-way communication still remains undetermined.

Citizens usually rely on emergency management officials to provide them with information and assistance when disaster strikes. According to studies conducted by Palen et al. (2011), Yasim (2010), Baruah (2012), Fraustino, Liu, and Jin (2012), Department of Homeland Security (2012), and the PEW Research Internet Project (2010), more than 4.2 billion people in the world have access to social media. In the Unites States, 40% of cellular phone users have access to social media, and 72% of adult users use social media networking sites. Hughes et al. (2011) concludes that social media is becoming the primary source of communication during a disaster. Networks such as Twitter, Facebook, MySpace, YouTube, and LinkedIn are used most often by citizens to send warnings, request assistance, and provide updates from the scene and announce safe zones. However, information sharing is generally among citizens themselves and not from an official point of reference.

Yasim (2010) points out as more citizens use social media to seek assistance and report emergencies, they will expect public safety officials, emergency managers, and first responders to be engaged in using social media technology to provide them with the information and support they need. It is important to understand the various roles social media plays in the public's communication activities and which functions are more

important during a disaster (Fraustino , Liu, & Jin, 2012). Contemporary researchers are urging the study of several key areas such as what role can the various social media sites play in disaster communications and can it be use as a two-way information tool. However, other issues also need to be address including if there are differences in the first responders and citizens use, expectations, and understanding as to their role in the use of social media use before, during, and after a disaster. The problem is that there are gaps and a lack of understanding existing between citizens and public safety officials in the use of social media as a two-way communication tool during disasters.

Purpose of Study

The purpose of this study is to examine whether or not there is a difference between first responders and citizens contributing to emergency management responsiveness using social media South Florida. Smith (2012) states that it is important to understand why citizens are using specific social media platforms, which will allow for a strategic linkage between organization needs and the informational needs of the targeted audience. However, most first responders limit their use of social media due to the various traditional systems in place, rules and regulations, policies, and a lack of understanding. Smith (2012) adds that the mass media (e.g., newspaper, television) is a one-way communicator that does not provide instant feedback as do social media. First responders and citizens' personal characteristic in the use, skills, behaviors, and needs plays a significant role in how they may present and receive information before, during, and after a disaster. The second part of this study seeks to determine how best they may

be able to contribute to emergency management responsiveness during the various phases of emergency management operation.

Su, Wardell, and Thorkildsen (2012) states that there are many aspects of social media which are new to emergency management and public safety officials, and there is a strong demand for them to learn how social media can be applied in disaster situations.

Research Questions

Are there differences between first responders and citizens contributing to emergency management responsiveness using social media?

The hypotheses are:

H0: There are no differences between first responders and citizens contributing to emergency management responsiveness using social media.

Ha: There are differences between first responders and citizens contributing to emergency management responsiveness using social media.

The dependent variables are:

1. Is there a difference between first responders' and citizens' Internet activities used with handheld devices?

2. Is there a difference between citizen and first responder's ownership of handheld devices capable of accessing the Internet?

3. Is there a difference between first responders and citizens in frequency of using the Internet from a handheld device?

4. Is there a difference between first responders and citizens in skill level using course or learning management systems?

5. Is there a difference between first responders and citizens in frequency of using social networking websites such as Facebook, MySpace, Twitter, Instagram, LinkedIn, and so forth?

6. Is there a difference between first responders and citizens in purpose of using social networking websites?

7. Is there a difference between first responders and citizens in restricting who has access to their profiles on social networking sites?

8. Is there a difference between first responders and citizens in use of social networking websites?

9. Is there a difference between first responders and citizens in comfort with technology?

10. Is there a difference between first responders and citizens in use of social media for information during a disaster?

11. Is there a difference between first responders and citizens in communication media used to get the most recent news, events, information, education material, and so forth?

12. Is there a difference between first responders and citizens in news media relied on to provide the most current information when the last disaster struck (local, national or international) occurred?

13. Is there a difference between first responders and citizens in frequency of times they received an alert, warning or public service message from local government on iPad, Smart Phone or portable device?

14. Is there a difference between first responders and citizens in best use of social media before, during and after a disaster?

15. Is there a difference between first responders and citizens in best use of a two-way communication social media system to provide education, information, assistance, and so forth to serve public safety needs?

16. Is there a difference between first responders and citizens in intended participation in a centralized social media site sponsored by the government specifically for public readiness and safety during disasters and crisis?

Definition of Terms

This study utilizes a number of key terms that are relevant to emergency management and social media to provide clarity.

Crowdsourcing is used to map a wide range of issues. Crowdsourcing makes it easier for a large group of people from all over a region, city, and country to document where problems are occurring and when. This information is used to help respond to problems, provide aid to regions that need it and keep the public up-to-date on issues as they progress (Gao, Barbier, & Goolsby, 2011).

Crisis Informatics is the study of social and technical behaviors in emergency response focusing on information exchange between people and organizations involved (Liu et al., 2009).

Facebook is a social networking website originally designed for college students, but is now open to anyone 13 years of age or older. Facebook users can create and customize their own profiles with photos, videos, and information about themselves. Friends can browse the profiles of other friends and write messages on their pages (Barauh, 2012).

Fusion Center serves as a focal point within the state and local environment for the receipt, analysis, gathering, and sharing of threat-related information between the federal government and state, local, tribal, territorial (SLTT), and private sector partners. Its primary purpose is to identify and warn about impending terrorist plots that could impact the United States. Located in states and major urban areas throughout the country, fusion centers are situated to empower front-line law enforcement, public safety, fire service, emergency response, public health, critical infrastructure protection, and private sector security personnel to understand local implications of national intelligence, thus enabling local officials to better protect their communities (Theil & Jennings, 2012).

Geotargeting is the process of providing unique content and services to website visitors based on their geographical location. It is used in Internet marketing techniques to identify, prioritize and target users in accordance with their physical location (Department of Homeland Security, 2013; Federal Communication Commission, 2014).

Social media is a collective of online communications channels dedicated to community-based input, interaction, content sharing, and collaboration. A number of Internet based tools and platforms are sharing information such as text messages, videos, photos, and audios. Examples of social media sites and applications include YouTube, Facebook, Instagram, and Twitter (Franustino, Liu, & Jin, 2012).

Instagram is an online mobile photo-sharing, video-sharing, and social networking service that enables its users to take pictures and videos, and share them on a variety of social networking platforms, such as Facebook, Twitter, Tumblr, and Flickr (Franustino, Liu, & Jin, 2012).

Linkedln is a social networking site designed specifically for the business community. The goal of the site is to allow registered members to establish and document networks of people they know and trust professionally.

Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. It is taking action before the next disaster—to reduce human and financial consequences later (analyzing risk, reducing risk, insuring against risk). Effective mitigation requires that there is an understanding of local risks, addressing the choices to ensure public safety, and investing in long-term community well-being. Lindsey (2012) adds that mitigation activities entail identifying risks and hazards to either substantially reduce or eliminate the impact of an incident usually through structural measures. This includes reviewing building codes that address risks such as fires, high winds, or

earthquakes which may cause major damage during a disaster (Federal Emergency Management Agency, 2012; Thiel & Lindsey, 2012).

Preparations focus on eliminating or reducing risks, enhancing the capacity to respond to an incident by taking steps to ensure personnel and entities are capable of responding to a wide range of potential incidents. Preparations include planning, training, procuring resources, and activities before disasters occur (Federal Emergency Management Agency, 2012; Thiel & Lindsey, 2012).

Response is the activities that comprised the immediate actions to save lives, protect property and the environment, and meet basic human needs. Response involves the execution of emergency plans and related actions, and may include deployment of response teams, medical stockpiles, and other assets needed to assist in aiding victims of the disaster (Federal Emergency Management Agency, 2012; Thiel & Lindsey, 2012).

Recovery is composed of activities intended to restore essential services and repair damages caused by the incident. Activities may include the reconstitution of government operations and services (e.g., emergency services, public safety, and schools) and other regular services (Federal Emergency Management Agency, 2012; Thiel & Lindsey, 2012).

Twitter is a free micro blogging service that allows registered members to broadcast short posts called tweets. Twitter members can broadcast tweets and follow other users' tweets by using multiple platforms and devices (Reuter, Heger, & Pipek, 2013; Starbird & Palen, 2011).

Ushahidi, meaning *testimony* in Swahili, is a platform developed to map reports of violence in Kenya after the post-election fallout at the beginning of 2008. This free and open-source platform is designed for users to crowdsource, aggregate, and map crisis information from multiple sources in near real-time. These sources include text messages (SMS), social media (Twitter, Facebook, blogs), traditional online media, email, radio, and television. Organizations have deployed the Ushahidi platform in multiple contexts around the world, including election monitoring in Afghanistan; disaster response in the Philippines; and the documentation of human rights abuses, crime, and corruption world-wide. Ushahidi provides unique information channel aggregating and processing collected on community level (Fraustino, Liu, & Jin, 2012).

Upstream is a video platform known for its ability to provide viewers with different ways to interact with the presenter during a live broadcast, providing broadcasters with chat and instant polling features, as well as allowing integration with Twitter and Facebook news feeds.

Web 2.0 is different than the traditional World Wide Web. Web 2.0 offers greater collaboration among Internet users, content providers, and enterprises. Originally, data were posted on websites, and users simply viewed or downloaded the content. Web 2.0 users have more input into the nature and scope of Web content and can exert real-time control over it. The social nature of Web 2.0 is a major difference between it and the original, static Web. Web 2.0 enables community-based input, interaction, content-sharing and collaboration (Fraustino, Liu, & Jin, 2012).

YouTube is a website designed for sharing video. Millions of users have created accounts on the site that allow them to upload videos that anyone can watch. It is an online public communications site that enables users to upload and have available for the public their videos for viewing. Anyone who goes to the site can view the videos that are posted (Fraustino, Liu, & Jin, 2012).

Theoretical Framework

Are there differences between first responders and citizens contributing to emergency management responsiveness using social media? Kadushin (2004), Varda, Forgette, Banks, & Contractor (2009), Starbird and Palen, (2011), and other researchers suggest that social network theorists examine social interactions and network structures as they relate to disaster management. Theoretical studies on social networking conducted by researchers such as Granovertter (1973), Kadushin, (2004), and Kapucu, (2005) suggest a wide range of social network understanding is needed in disaster management. Varda, Forgette, Banks, and Contractor, (2009) add that it is important for public safety officials to understand the reasons why or why not the public uses social media before, during and after disasters as a two-way communication tool effectively and efficiently. Granovetter (1973) states that social network theory is the study of people or groups relationships and their interactions with each other inside their network.

Bandura (2001) states that there is no single social network in a community that serves all purposes. While Kadushin (2005) suggests that there are several types of social networks which includes socio-centric network, ego-centric network, and open-system

network. Multilinked relations can foster adoption of innovations because they convey more factual information, they mobilize stronger social influences, or it may be that people with close ties are more receptive to new ideas than those who are socially estranged.

The emergency management system is an open, complex system, composed of numerous components, interconnections, interaction, or interdependencies, that are difficult to understand, predict, manage, design, or change. The dynamic changes that occur during disaster management often yield unpredictable results and emergency properties (Hughes, Palen, & Peterson, 2013). However, a vital part of that system is the action of first responders and citizens.

For this study, the Social Network Theory will be use to examine the social relationships of a network such as to why people uses various social media sites during a disaster. It interprets the actions of individuals, ties, linkages, and their organization behavior within the network system (Kadushin, 2004; Carrington, Scott, & Wasserman, 2005).

This research is an attempt to build upon existing researches on the coordination and use of social media, in conjunction with citizen and first responder as a communication tool in preparedness, mitigation, deployment and recovery during disasters. This lead to the following specific research question: In emergency management operations, there are differences between first responders and citizens contributing to emergency management responsiveness using social media.

Significance of the Study

This study is significant in determining whether social media can be used by citizens and first responders as a two-way communication tool during disasters and to develop an understanding of how these two groups can become organized and supportive in contributing to an effective and efficient emergency management communication system. Furthermore, it is important to understand first responders and citizen's interaction using social media during disasters. Social media as it relates to emergency management is relatively unstudied. Therefore, this study will attempt to build upon the existing literatures and studies by others such as the Department of Homeland Security, American Red Cross, Federal Emergency Management Agency (FEMA), Department of Homeland Security, and Federal Communications Commission (FCC); Hughes, Palen, & Peterson, 2013; Lindsey, 2011; Keim and Noji, 2011; Sarcevic, Palen, White, Starbird, Bagdouri, & Anderson, 2012; and Olteanu, Viewg, & Castillo, 2015.

Chapter Summary

It is a study to determine whether citizens and first responder would use social media as a means of communication before, during and after a disaster in the South Florida area. This study is important to public safety officials because it can provide a snapshot of emergency management role, how first responder will accept the use of social media, and the public behavior in providing two-way information and assistance during the various phases of disaster planning and efforts. It is an attempt to examine and explain that social media is and becoming a major source of communication and is able

to provide a valuable resource for public information and feedback in disaster situations from all levels emergency management.

Chapter 2: Literature Review

A review of the literatures suggests there is a need for an understanding of social networking and how it may impact emergency management and public safety officials in providing the greatest amount of information and assistance to the public during disasters. It further suggests that there is a need to be changes to the present traditional communication and support systems in emergency management operations to include social media, the public, first responders and end users to be effective due to changing technology (Grunig, 1980; PEW Research Internet Project, 2010; Merchant, Elmer, & Nicole, 2011; American Red Cross, 2011; Franustino, Liu, & Jin, 2012; Sarcevic, Palen, White, Starbird, Bagdouri, & Anderson, 2012; Department of Homeland Security Science and Technology Directorate and National Geospatial-Intelligence Agency, 2013; Su, Wardell, & Thorkildsen, 2013; and Hughes, Palen, & Peterson, 2013). Early studies have shown that during disasters, the two-way communication process inclusive of the public have significant values to emergency responders and public safety officials.

The literature review attempts to answer the question: why social network, as a communication tool, is important to emergency management during disaster preparedness, mitigation, deployment, and recovery at the public and emergency responder level is needed, and how user behavior can impact disaster efforts. The review also points to gaps in the understanding of the use of social media before, during and after a disaster. There is limited information addressing human behavior, group dynamic,

action, and stance in the use of two-way information exchange between the public and public safety officials using social media during disasters (Faustino, Liu, and Jin, (2012). Also, policies establishing and guiding the use of social media by citizens, first responders, emergency management, and public safety officials during disasters is basically best practices or does not exist.

Baruah (2012) suggests that once there is an understanding as to the benefits of the use of social media as a two-way communication system and why the public use different social media sites, it can be an effective and efficient way to communicate with the public. The value and use of social media technology such as environmental scanning and mapping, being able to receive and share credible information, and having a system where the public and first responders could participate may provide quicker response and recovery to affected disaster areas.

This review explores the historical use of social media, current issues, and elements of crisis communication, and the passive and active use of social media by the public during disasters. In addition, this study includes a discussion on theoretical frameworks as to how relationships develops between individuals and groups; types of social media platforms and apps; and an overview as to the implications and benefits social media use in disaster initiatives. The final portion of this study illustrates the need for an understanding of two-way social media use, best practices, implications and future advancements.

Skarda (2011) states that social media was the primary source of communication following the earthquake and tsunami that struck Japan in 2012. Networks such as Twitter, Facebook, and Mixi were used to send warnings, requesting help, and provide updates information from the scene and announcing safe zones. Governments, emergency managers, disaster preparers, emergency responders, law enforcement, and other agencies must take in consideration and understanding the factors and dynamics affecting the way information is provided, received and used by citizens in crisis and disaster situations (Department of Homeland Security, 2012).

Chan (2013) contends that the emphasis going forward should be to explore how emergency managers and public safety officials can foster better community engagement before the onset of a disaster or crisis, so as to tap the social media user's knowledge base and potential capabilities, where possible, to improve response. Hughes, Palen, and Peterson, (2013) states that emergency management agencies, which operate as command-and-control organizations, push information to members of the public with too few mechanisms to support communication flow back. Information communication technologies such as social media have challenged one-way model of communication by allowing the public to participate in emergency response in new and unexpected ways.

The Department of Homeland Security (2013) acknowledges that the use of social media by government and first response agencies have increased over the years. Sixty-eight percent of county emergency management agencies and 85% of local response agencies use social media to provide information to the public. Annamalia, Koay, and

Lee (2014) add that social networking makes sharing of news and information simple. When other communications fail, social media has connected people with resources.

History of Social Media

Ten years ago, social media such as Twitter and Facebook did not exist, but today there are hundreds of social media sites. In prior years and before the Internet, there was evidence of social media involving social interaction platform with private communication and the mass media (Baruah, 2012). During the 20th Century, the radio industry created a platform of public interaction through public call-ins for the public to share their personal sentiments with an audience. In the 1960's and 70's "Phone Phreaks" created by the telephone industry explored the avenue of global network by allowing ways for multiple callers to talk simultaneously, creating conference-call like chat rooms for real-time group interaction through the telephone system (Baruah, 2012).

Baruah (2012) adds that the later part of the 20th century begin the development and growth of the Internet which included email, ARPANET, USENET, Bulletin Board System (BBS), Napster were some of the sites for social interactions and sharing. It was not until 21st Century that social networking became popular with the addition of MySpace and Linkedln in 2003, Facebook and Flickr in 2004, YouTube in 2005 and Twitter in 2006. These social networking sites allow users to create profiles, personal pages, and build a social network (Baruah, 2012). These Web 2.0 made interaction of individuals and satisfied the public urge to connect with each other. This digital

technology has advanced social media by decades and continues to fuel the expansion of social media today as a communication modem.

Annamalia, Koay, and Lee (2014), Lindsey (2011), and Baruah (2012) add that social media are Internet based applications such as blogs, micro blogging, podcasts, discussion forums, chat rooms, Facebook, Twitter, and LinkedIn, which have become widespread and can serve a variety of purposes. Using social networking sites, individuals are able to share details of their condition, coordinate activities, and exchange information with friends, family and others in ways previously accomplished only in person.

Social Media use in Past Disasters

Researchers such Olteanu, Vieweg, and Castillo, (2015); Palen et al., (2010), and Lui et al. (2008) suggest when large amount of tweets which occurred during Typhoon Pablo which struck the Philippines is overwhelming to emergency services officials. According to another report, Twitter usage in Japan increased to 11,000 tweets per minute on the day of the Fukushima Quake in April 2011. With this amount of communication, many governments, organizations, and emergency responders became overwhelm and did not understood how to filter the vast amount of information they received (Lindsey, 2011).

Morris County Government Office of Emergency Management, Carol Spenser (2011) on their website announced a new emergency management information system, MCUrgent, which is a social media notification system that allows alerts through social

media sites. She states that during and in the days following Hurricane Irene, information about such incidents as road closures, power outages, rising river levels, and emergency shelters in Morris County towns was posted to the MCUrgent network. Spencer (2011) adds that emergency messages and situation updates can be immediately accessed from a phone, a desktop or laptop computer by a citizen via Twitter, Facebook, or text message. Other cities and local communities are developing ways in which to use social media as a two-way communication tool.

Maron (2013) adds that during Hurricane Sandy in 2012 more than 20 million post and tweets were sent during and after the hurricane despite telephone loss. Before the hurricane, people were being updated as well as during and after. The incident information was given as to where victims, relief efforts, and how the public can assist through social media. During the Boston Marathon bombing more than one quarter of Americans viewed Facebook for information relating to the incident. Merchant, Elmer, and Lurie (2011) suggests that the effectiveness of emergency system relies on routine attention to preparedness agility in responding to daily stresses and catastrophe, and the resilience that promotes rapid recovery. During the 2009 H1N1 influenza pandemic, the Department of Health and Human Services used a Mommycast -viewed on YouTube or downloaded as an iTunes video podcast - to tell 1 million viewers the situations in real time as to what was happening and how to prevent the spread of influenza.

Sawchak (2013) states while Twitter was used extensively during the earthquake and tsunami in Japan in 2012, Google's Crisis Response team helped develop a Person

Finder that acted as a message board for communication where cellular phone access was limited. In Japan a new application called "line" which was developed after the earthquake, provided free instant messaging and calling through various devices and soon became one of the world's fastest-growing social networks. When Super Storm Sandy struck the northeastern United States, a variety of agencies and individuals used social media in a strategic and tactical way to provide information and assistance to the public.

Qu, Huang, Zhang, and Zhang (2011) state that micro blogging was a factor in the response efforts during Yushu, China Earthquake in 2010. The system facilitates emergency response as it provides an information platform with easy accessibility, short messages composed and shared among a large group of people. They suggest that the platform was based on real time information similar to Twitter use during the 2007 California Wild Fire, 2009 Red River Floods, and the 2009 Oklahoma Grass fires.

Carfago (2014) argues that managers and others has to make sense of and respond to disasters because of the changes in the way the public is relying on social media for their news and information. These changes are due to social media and the type, speed, and volume of data, as well as the constantly evolving technologies now accessible to them during disasters Hughes and Palen (2012) adds that these new information communication technologies, such as social media, have challenged one-way model of communication by allowing the public to participate in emergency response in new and unexpected ways. Smith (2012) adds that the mass media (e.g. newspaper, television,

radio) are one way communicators that does not provides instant or real-time feedback as do social media platforms.

Sarcevic, Palen, White, Starbird, Bagdouri, and Anderson, (2012) in their study on medical response during the earthquake in Haiti conclude that social media data showed that pre-deployment preparation was hampered by teams not knowing the conditions they were about to face. There was little evidence of social media being used for pre-deployment coordination. However, they state that it presents an opportunity for future rapid and more comprehensive preparation through a network of those already on the ground or in a state of pre-deployment. Sarcevic et al. (2012) suggest that coordination during preparation is important because of their potential to optimize resources and deployment while they still have the flexibility to do so. They add that the nature of medical work in disaster response is a highly distributed and decentralized work activity, often ill- coordinated by virtue of the nature of the event itself. Effective coordination is a critical and elusive ally in disaster and crisis mitigation.

Social Network Theory and Emergency Management

Granovetter (1973); Katz, Lazer, Arrow, and Contractor (2004); Kadushin (2004); Williams and Durrance (2008) suggest that Social Network Theory involves knowing how people, organizations or groups interacts. It offers some insight and explanation as to how people are connected and suggest an understanding of how groups and their members interact with other group. The network consists of people (node) and their relationships. There are three types of social network which includes ego- centric – a

single node or individual connecting all their friends; social centric- involves a closed network by default such as students at a university or firefighters on a department; and open-system networks that has no defined boundary lines and difficult to understand (Kadushin, 2005).

Zhao (2013) states that early disaster researchers had notice the role of social networks and social capital disasters and determine that it may be the most dependable resource during the recovery phase. However, in his study of the Wenchuan Earthquake, he concludes that social network plays a vital role in reducing risk during and after disaster. In the beginning of a disaster, much of the search and rescue activities come from social members. He adds that during the aftermath of a disaster, social network can facilitate the flow of information and can provide support and help maintain the mental health of others.

Katz, Lazer, Arrow, and Contractor (2004); Kadushin (2005); and Williams and Durrance, (2008) suggest what emergency managers, public safety officials, and first responders need to understand is the reasons for these people interaction and what is the level of their closeness to determine communication flow. One such experiment, Six Degree of Separation, conducted by Stanley Milgram suggests that it takes six steps to complete a cycle in a social network. However, in the social media setting, information flow has a much greater impact on social network. Information is generated at the node level and moves quickly to others connected relationships, creating a change quickly throughout the network

Kadushin (2005) contends that the Social Network Theory provides an understanding of the various levels of interactions, critical roles they play in solving problems, how they operate and how they succeed. Li and Goodchild (2010) contends that social networks play major roles in emergency management by generating and disseminating information and provide a means of studying the relationships, behaviors, and interactions of the public during the disaster to assist planning evacuations and sheltering and other rescue initiatives. Skarda (2011) adds that social media can be used in several ways before, during and after a disaster or crisis which includes a) sharing information and spreading awareness, b) assist in relief operations, c) establish a communities of volunteers, and helpers, and d) for collecting funds, monitoring and providing insights of the total disaster situation.

Fraustino, Liu, and Jin, (2012) suggest that there are many reasons why the public use social media in which includes for emotional support and healing, credible and unfiltered information, convenience, self-mobilization, check disaster situation, maintain a sense of community, check on friends and family. Liu et al, (2008) state that **"**theories on collective behavior and social convergence are used to explain the different roles and motivations that emerge from the mass influx of volunteers, goods and services, and of information in the aftermath of a disaster." Fraustino, Liu, and Jin, (2012) add that some researchers have determined that individual uses social media differently during disaster to obtain specific information and emotional needs. They suggest that people uses

different platform and sites for different reasons. During disasters, the public become either passive or active users.

Other Theoretical Frameworks to Consider

Several other theories also were considered for a better understanding of social media communication with the public is Situation Crisis Theory, Crisis Communication Theory, Chaos and the Contingency Theory. The Situation Crisis Theory deals with the response strategies- deny, diminish, rebuild, and reinforcing. The Contingency Theory which uses variables to evaluate what communication actions and strategies should be considered by public safety officials during a disaster (Coombs, 2010). This was important to provide greater understanding of the communication process during disasters.

Combs and Holiday (2011) suggest situational crisis communication theory determines which organizations will protect citizens and will help them with information and will adjust information as needed during a disaster. McEntire (2004) argues that theoretical frameworks, including social network theory, may not be appropriate in studying and understanding public and organization behaviors and interactions during disasters. He contends that not until there is a theory of emergency management as it relates to disasters will there be a true understanding of how to use social media effectively and efficiently in rendering assistance to the public. Streeter and Gillespie (1993) state that network analysis is more effective when combine with other methods in developing theory. Identifying clusters and groups or observing human patterns in

graphic models are technique that enhance descriptive of behaviors and the systems in which behavior take place.

Varda, Forgette, Banks, and Contractor, (2009) state when studying disasters, an in/Out/Seekers/Provider (IOSP) framework, should be used to identify the impact of a disaster on and to a social network. They find that there are various types of publics, all-issue publics, apathetic publics, single issue-publics, and hot-issue publics.

Kapucu (2005) states disasters represent occasions in which the boundaries between organizational and collective behavior is blurred. He states "the insight of both network and complexity theories can help construct inter-organizational networks and help us understand their workings. He adds that effective response and recovery during disaster operations require trust through continuous collaboration. It is important that collaboration exist among various governmental levels and between governments, the private sector, the non-profit sector, and the public. However, Townsend, and Moss (2005) suggest that the Crisis Communication Theory may be of the utmost to understand during a disaster in conjunction with the Social Network Theory.

Five Major Social Media Sites Used During Disasters

Hughes, Palen, and Peterson (2013) state that people have a desire to be connected with other humans and be a part of a group. Their use of the various social media site is dependent upon their interest and reason could include, the passing time, social interaction, real time information and knowing about friends and others. The most used social media sites during disaster are:

1. Facebook which is considered the largest social platform where people share personal information including pictures and finding lost friends.
2. Twitter is a niche site of various interests with mostly information about celebrities and cultural figures.
3. Linkedln is the platform used by professionals seeking a job, professional contacts and shared information related to businesses and industrial world.
4. YouTube is a community information seeker that includes pictures, videos and simple information from professionals to amateurs, and
5. Instagram is the new fast growing platform that transmits pictures and information instantaneously from various sources and users.

Li and Goodchild (2010) suggest that the time to receive geopatical information by public safety official regarding a disaster is lengthy; the information generated and distributed by users of online social networks can be spontaneous. Volunteer Geographic Information (VCI) such as Crisis Mappers.net have the ability to link thousands of network volunteers worldwide in the production and digital creation of map as was done during the 2010 Haiti Earthquake. OpenStreetMap (OSM) or Ushahidi has been proven to be useful in developing emergencies. Li and Goodchild (2010) and Baruah (2012) add that social media is an effective way in building social authority by individuals or organizations and be considered experts in their field in providing two-way information exchanges. Social media is also providing an inexpensive way to spread information and gauge opinions during disaster.

According to Qu, Huang, Zhang, and Zhang (2011) based upon their studies, suggest that there is four reason as to why people uses the micro blogging system during and after a disaster: situation updates, express opinions, emotional support, and calling for actions. Their research indicates that people attention shift from issue to issue depending what phase the disaster is in. Other technologies such as Google's Person finders, Skype, and Line have allowed a large number of people to connect and communicate during a disaster. Merchant, Elmer, and Lurie (2011) state,

> Social media are changing the way people communicate not only in their day-to-day lives, but also during disasters that threaten public health. Engaging with and using emerging social media may well place the emergency-management community, including medical and public health professionals, in a better position to respond to disasters. The effectiveness of our public health emergency system relies on routine attention to preparedness, agility in responding to daily stresses and catastrophes, and the resilience that promotes rapid recovery. Social media can enhance each of these components. (p. 290)

Annamalia, Koay, and Lee (2014) and Chan (2013) state that the five key characteristics of social media that should be considered in disasters are: a) collectivity – it is the collective nature to connect people of similar interest across boundaries, (b) connectedness – connects users to other resources through sharing of Web links, (c) completeness – ability to capture contributions and keep them available for sharing and viewing, (d) clarity – content on social media is highly visible, and (e) collaboration –

people are encouraged to share and contribute, by gathering information and provide feedback. They state that each of these frameworks for Social Networking should be considered in disaster management. It is essential in considering how social media applications can be incorporated into an integrated disaster management platform. This leveraging of social media technologies for disaster management provides citizens with a greater role in preparing for and managing disaster (Li & Goodchild, 2011).

Annamalia, Koay, and Lee (2014) add that in all of the four phases in managing a disaster, the information at hand is important for the relevant parties to make appropriate decisions and to plan actions. The timeliness and accuracy of the information is essential in reducing the impact of the disaster.

Social Media as a Tool in Disaster Preparedness, Mitigation, Deployment, and Recovery

A disaster is considered to be a disruption of the function and activities of a community that causes human, material, economic or environmental losses which exceeds the ability of community resources (National Science and Technology Council, 2005). It can affect a community's ability to operate effectively, cause injures and displace people, causes serious structural damages, loss of assets, and reputations.

Thiel and Jennings (2012) state that emergency management is a managerial function design to create a framework approach involving planning, coordinating, training, and exercising for a variety of unforeseen and predictable disasters that may occur in a community. Lindsey (2012) adds that emergency management functions are

generally grouped into four phases: (1) Mitigation – identifying risks and hazards to reduce or eliminate the impact; response (2) Preparedness – preventive activities to reduce the risk; (3) Response – immediate actions to save lives, protect property and the environment; and (4) Recovery activities that are intended to restore essential services and repair damages caused by the incident. This grouping of emergency management functions is useful for classifying and conceptualizing activities as well as targeting efforts and resources (Federal Emergency Management Agency, 2012; Lindsey, 2012; and Chan, 2013).

Chan (2013) adds that there are four major functions that are essential to effective crisis and disaster management which includes:

1. Information dissemination: Information dissemination through social media tools is an effective means to provide reliable information quickly to the public to enable them to better prepare for and respond to crises.
2. Disaster planning and training: Gamification4 leverages social media for disaster planning and training to promote personnel training, scenario planning and collaboration between various crisis management agencies from the public sector, private sector and civil society organizations.
3. Collaborative problem solving and decision making: Crowd- sourcing using social media facilitates collaborative problem solving and decision making by integrating various streams of information from mobile and web-based technologies to fill the perceived sense-making and

information gaps as well as to aggregate, analyze and plot data about urgent humanitarian needs.

4. Information gathering: On-the-scene footage, citizen journalism and disaster assessment are central to information gathering for coordinating crisis response.

Townsend and Moss (2005) state that domestic preparedness for disasters is focus primarily on improving the reliability, capability, and inoperability of communications systems. They suggest that the entire civil telecommunications infrastructure which includes all phases of disaster management planning.

Trainor and Subbio (2014) suggest that the coordination of an effective response system to a disaster requires good Intel to allow for accurate deployment and immediate care for those who are in need of assistances. With the use of many possible recon team - the public- information can be received and given in real time to citizens by emergency services. Woodcock (2009) adds that public safety and emergency managers can then focus resources to the right area, provide detailed information and support to the right people, and eliminate the costly duplication of efforts. He proposed that leaders and managers in the field of emergency services, as technological advances add more functions to social media, they will face greater challenges in how to use social media as a two-way communication tool. However, the main challenge will be how to use the public through social media to be able to better help themselves during disasters.

Hughes, Palen, & Peterson (2013) states that technologies such as social media have challenged the one-way model of communication by mass media by allowing the public to participate in emergency response in new and unexpected ways. He added that these developments placed new pressure on emergency managers to release information over social media streams, monitor online activities during an emergency event, incorporate information provided by members of the public into response efforts, and engage in the public conversation around the event. Carfago (2014) states that emergency managers and others have to make sense of and respond to disasters and crises because of the changes in the way the public is relying on social media for their news and information. These changes are due to social media ability to afford two-way interaction and the type, speed, and volume of data, as well as the evolving technologies accessible to the public during a disaster.

Stephen (2014) states that using social networks to communicate emergency, safety and preparedness information is becoming a standard operating procedure for quite a few emergency management and response organizations. Each event can provide an opportunity to understand how to improve and adjust. Situations change rapidly. When emergency managers and public safety officials post content about various situations, they must make sure the user does not have to go to another site to get more or updated information**.** He adds as conditions change, posts should be mobile ready and change with time and situation. Images should be used to make a point and efforts should reinforce where citizens can find information ***o***n all platforms. The linking and

reinforcing of information outlets is important because it is not known where the citizen will start their search**.**

Yasim (2010) states that social media tools allow emergency managers to disseminate information to wider audiences, interact with the public, monitor social media networks to get a better sense of what is happening on the ground during a crisis, get better situational awareness, and improve collaboration for sharing information during an emergency and sharing of best practices and lessons learned. He claims that the Federal Emergency Management Agency to state and local entities, emergency operators are using social media and Web 2.0 technology to reach out and interact with the public and enhance communications among partners. Social media, Web 2.0 or Web-enabled technologies have provided the way for emergency management personnel to solve data and other types of interoperability and communications problems.

Maron (2013) adds that the new playbook will not do away with the emergency broadcast system and other government efforts. However, it will include new data from researchers, federal agencies and nonprofit organizations that may reveal the exact penetration of social media in disasters and support modem for the community. This will allow uniform dissemination of information, responses and a better understanding of feedback from the public.

Mergel (2013) concludes that it is more important for government and public safety officials to build a community before the disaster strikes, so that the public can assist each other. Citizens should be reachable for government when it is necessary to

point them to shelter, new locations of hospitals, or react to government intervention when required. She further states that citizens tend to vet information, such as emergency announcements, to seek shelter through their trusted friendship and family ties on social media. Hughes, Palen, and Peterson (2013) suggest it is important for the government to get into these social awareness feeds early, where citizens are willing to share announcements and background information. Early dialogue will develop trust, integrity and a community of followers.

In a survey conducted by Su, Wardell, and Thorkilden (2012) conclude that most emergency management officials use social media in some capacity and have a Twitter account, Facebook page, and Website. However, they lack the understanding of social media and how it can be used during disaster communication, resource and deployment tool. Many still uses social media as a medium and means to push information out to the public. Su, Wardell, and Thorkildsen (2012) suggest that public safety officials are facing many challenges which limit their ability to move forward with social media technology such as lack of train personnel, policy and procedures and the lack of understanding of crisis-mapping, crowdsourcing and micro-tasking.

Chavez, Repas, and Stefaniak (2010) argue that information technology offers many possibilities, but introducing technology in disaster preparedness will be not the solution for reducing disasters, poverty and other social problems. Information technology can be either a facilitator or an obstacle for development and behavioral change in a crisis. They state that individuals experiencing a higher learning culture

choose different types and use information technology that support learning goals in a greater extent than do individuals without such a culture.

McCorkindale and Morgoch (2013) studied mobile-ready vs. non-mobile ready sites, and find that "non-mobile ready websites were more likely to follow the five tenets of dialogic communication due to the lack of offerings and depth of mobile sites. However, non-mobile ready sites led to frustration with mobile users. However, McCorkindale and Distaso (2014) state that mobile technologies have not been studied in terms of communication. The increase in its use such (e.g. iPhones, laptop, iPad) requires more study.

Benefits of Social Media

Liu, Palen, Sutton, Hughes, and Viewg (2008) state that photography is playing a significant role in disaster response and recovery efforts. Maron (2013) suggests that it would be useful to teach the public to use social media as to how to get and receive information from the Web and how to post useful information for emergency use. Even though there are inherit risks from disinformation, this can be limited through careful strategic preparedness planning by emergency management officials.

Merchant, Elmer, and Lurie (2011) state,

> Social media are changing the way people communicate not only in their day-to-day lives, but also during disasters that threaten public health. Engaging with and using emerging social media may well place the emergency-management community, including medical and public health professionals, in a better position

to respond to disasters. The effectiveness of our public health emergency system relies on routine attention to preparedness, agility in responding to daily stresses and catastrophes, and the resilience that promotes rapid recovery. Social media can enhance each of these component efforts. (p.290)

Challenges

Peterson (2014) states that there are challenges that prevented social media use in emergency management. However, within the emergency management community as technology information was shared from many empirical researches documenting online behavior, it increased the interest as what social media could contribute to emergency management operations. Hughes, Palen, and Peterson (2013) states that emergency response agencies, which operate as command-and-control organizations, push information to members of the public with too few mechanisms to support communication feedback. Recently, information communication technologies such as social media have challenged this one-way model by allowing the public to participate in emergency response in new and unexpected ways.

Hughes, Palen, and Peterson (2013) and Lindsay (2011) state that emergency managers are beginning to embrace and incorporate social media into their disaster and crisis planning initiatives. Goldfine (2011) suggests the biggest obstacle emergency managers is facing is the limited amount of time to dedicate to social media and staff who are familiar with the appropriate communication strategy to be effective.

According to a report by the Department of Homeland Security (2013) add that there are several operational challenges confronting public safety and emergency services officials. They are:

1. Identifying actionable data from the massive volume of available data received from social media users before, during and after a disaster.
2. Engaging with the public as to getting the public to respond to official information and message being sent out and whether there is a way to reach audiences from different media platform.
3. Information sharing by gathering all data in one central location that can be shared within an agency and partners during an event.
4. Discoverability of data. Who has what information in the various social media platform and how access can be obtained.
5. Policy issues in which some social media have barriers for some of their users and those entities have buy-in in developing a social media strategy or policy to identify how social media will be organized, managed and executed in a uniform manner during a disaster.
6. Training volunteers and responders to use social media.
7. Process and standards as to what key collaborators to do during emerging disasters when assessing communications infrastructure, collecting information, filtering and anonymizing data, and sharing information.

8. Data integration as to how social media data can be integrated and consolidated across platforms to better manage the data and avoid duplication of efforts. (pp. 282-289)

Lessons and Best Practices

Yasim (2010) points out that as more citizens use social media to seek assistance and report emergencies, they will expect emergency responders to be engaged in using the technology. Lindsay (2011); Hughes, Palen, and Peterson (2013) state that there are a number of "best practices" and "lesson learned" during the use of social media during a disaster by emergency managers and public safety officials. Lindsay (2011) states that based on best practices and lesson learned to date, the objectives of the use of social media should be based on targeted audience, appropriate information to be dissemination in the best interest of the public and identify any negative consequences arising from the application. They add that there may be some potential policy issues and drawbacks to social media use. Most emergency managers and government officials have set policy as to who will disseminate what information to the public. This may be a hindrance during emergency operations (Abbasi, Kumar, Andrade Filho, & Liu, 2012).

However, the Department of Homeland Security (2013) suggest there is a need to have a collaboration tool process in place to handle the technological changes, information flow and research, and best practices. This will ensure lessons learned and foster success in multidisciplinary collaboration and engagement in the operational

efforts of a disaster. Goldfine (2011) adds that best practices should be used as guidelines because each disaster is different and cannot be given a simple standard.

Brooks (2014) suggests that too few state and local officials do not know how to, or are not yet using, social media to communicate during a disaster is very troubling. Public safety officials should do more to promote its use at the state and local level. FEMA currently provides limited social media-related training; it is imperative this training is available to local emergency managers as well as federal and state managers. Reuter, Heger, and Pipek (2013) add that there must be an understanding and the addressing of all possible cooperation scenarios between the stakeholders involved to increase collaborative resilience of communities.

Knackmuhs (2011) states that by using social media as a source of park information, interacting on park-sponsored social media sites and being able to use it continuously has statistically significant and positive relationships to interpretive outcomes and place attachment. He adds that the more respondents using the social media platform to view this parked information, the more connections to resource meanings and the higher the levels of interpretive connections and place attachment. In addition, passive interaction with park-sponsored social media information also continued to influence future outcomes in disasters.

Public Concerns

Jayson (2014) states the possibilities are unlimited as to what can be done with social media as a tool. However, there are concerns among social media users as to what's

ahead with governmental involvement and many does not like that their behavior is under a microscope. He contends that this is becoming a concern of public and private organizations who are attempting to win over the trust of the public without evading their privacy. Baruah (2012) states that there are pros and cons in the use of social media, an advantage is the amount of information and knowledge that can be shared instantly among many people and the possibility disadvantage of misuse of information that could harm people or invade their privacy.

Verton (2013) states that at the same time, terrorist organizations and other criminal elements are increasingly utilizing social networking sites, for both recruiting purposes and for the planning, financing, and execution of nefarious acts. As such, social networks have become a valuable source of intelligence for the law enforcement and intelligence communities that enable the collection of information pertaining to individuals in ways not previously possible.

Verton (2013) and Risen and Poitras (2013) state that the National Security Agency has been collecting data to create sophisticated graphs of Americans' social connections that can identify their associates, their locations at certain times, their traveling companions and other personal information. A reason maybe according to Staton (2013) is due to a study about the National Security Agency spying and has its own way of keeping tabs on the American public via social media.

Another concern, according to Staton (2013), is the use of misinformation. Social media has both positive and negative implications for public officials and agencies. He identified the possible legal issues and implications for public officials to include:

1. First Amendment issues relating to government restrictions on speech;
2. Use of public resources, including both personal and political use;
3. Restrictions on employee use of social media, both on behalf of the agency and personally;
4. Open meeting law issues; and
5. Public records retention and disclosure issues.

He adds that the best way to address these issues is to adopt policies that guide both the public and staff on how the agency is using the tools offered by social media. Peterson (2014) adds that social media can also accelerate misinformation spread that can endanger citizens and first responders. Emergency management users must have a system in place to correct misinformation and rumors. He states this can be done by having a dedicated staff to monitor, analyze and communicate social media information.

Lenkart (2011) adds that social engineering, when coupled with the new and widespread use of social networking media becomes more effective by exploiting the wealth of information found on the social networking sites. This information allows for more selective targeting of individuals with access to critical information. He further states that social networking media introduces a new set of vulnerabilities to protecting an organization's and citizen sensitive information. Competitors and foreign adversaries

are actively targeting U.S. industry and organizations to acquire trade secrets and determine ways in which to carry out attacks and damage while others seek information for identity theft. He contends that social media collaboration may be a medium for terrorist organizations to create havoc in a country through rumors and disinformation during a disaster or crisis.

Verton (2013) adds that terrorist organizations such as Al Qaeda and the Affiliated Movements are found on websites and social media outlets hosted by companies and Internet Service Providers (IPS) in various countries including the United States. Merchant, Elmer, and Lurie (2011) state that social media are changing the way people communicate with each other and it can be a threat public health and safety when used inappropriately. However, engaging with and using emerging social media can place the emergency-management community, including medical and public health professionals, in a better position to respond to disaster if a system is in place to filter information.

Brooks (2014) suggests that social media is beginning to be the primary ways information is shared in society. This is particularly true during times of emergency, where people turn to social media to obtain public safety information, connect with friends and family, and even request assistance from emergency response organizations.

There is a lack of regulations, laws and policies in place to regulate who, what, when, where and how on social media sites from a state, national or international level. Jayson (2014) states that each time a search or activity is done online; it leaves cyber

footprints that are rapidly becoming fodder for research without the public realizing it. Using social media for academic research is also accelerating and raising ethical concerns along the way, as vast amounts of information collected by private companies — including Google, Microsoft, Facebook, and Twitter — are giving new insight into all aspects of everyday life.

Jayson (2014) state that data mining online communication has already helped Microsoft identify women at risk of postpartum depression. It has also allowed Facebook to study how parents and kids interact. This also threatens the trust and tolerance of the public about social media interaction as well as the integrity of the government doing the right and ethical thing with the data they receive.

White, Plotnick, Kushma, Hiltz, and Turoff (2009) suggest social media is becoming a prime tool in the management of major disaster and crisis situations. However, the law pertaining to surveillance in cyberspace has failed to keep pace with society's adoption of social networking and other cloud computing technologies. Keim and Noji (2011) state that social media is a form of information and communication technology disseminated through social interaction. It relies on peer-to-peer (P2P) networks that are collaborative, decentralized, and community driven. They also suggest the role of social media in disaster management became galvanized during the world response to the 2010 Haiti Earthquake. During the immediate aftermath, much of what people around the world were learning about the earthquake originated from social media sources.

In the United States, according Brooks (2014), government agencies and others turned to online technology to communicate with the public during Hurricane Katrina in 2005 and extensively during the 2012 Super Storm Sandy disaster. It marked a shift in the use of social media in disasters. Before, during and after the hurricane, the public relied on and received most their updates and assistances through social media from FEMA, the American Red Cross, utility companies, public and private support groups, and other ad-hoc groups in a centralize format. It marked the beginning of uniform efforts by governments, public and private agencies and volunteers working together to provide assistances and accurate information to the public in a timely and systematic manner (Knackmuhs, 2011).

However, as suggested by Hughes, Palen, and Peterson (2013) incorporating social media into the National Incident Management System (NIMS) present some challenges to emergency management officials. From an operational perspective, new procedures, standards, and training will be needed for first responders, emergency managers and public safety and the public on the use of social media technology during disasters.

Chapter 3: Methodology

Research Design

The purpose of this quantitative case study is to determine first responders and citizen knowledge, use, and acceptance of social media as two-way communication tool before, during, and after disasters.

There is limited data and information on first responder role and moderate understanding of citizen role in the use of social media during disasters in the emergency management field. Creswell (2009) states that a quantitative methodology is suitable when determining aspects that could sway a particular result of examining a particular premise. The use of social media as a communication tool between first responders and citizens may have a positive or negative impact on how preparation, planning, and operational efforts are done before, during and after a disaster.

The reason for using a non-experimental, descriptive design was to describe the population being studied, but what is being encountered. It was to find more information to generate a hypothesis and identify variables and hypothetical situations (Swatzell & Jennings, 2007). The use of a quantitative measure is consistent with the objective of the study which to seek whether there are differences in social media use among citizens and first responders. It is also an attempt to measure whether there are differences in citizen and first responder expectation, use and attitude of social media before, during and after disasters. An explanatory descriptive research methodology is used because it allows for an assessment of first responders and citizens relationship. The use of quantitative

measure is used because it allows for objectively determine the differences between the dependent variables and how it relates to each other (Creswell, 2014). This survey research offers a quantitative explanation of social media as a two-way communication tool by studying 150 citizens and first responders in South Florida.

This study uses a survey instrument designed similar to the surveys developed by Su, Wardell, and Thorkilden (2012) and modified by Martini (2014). The survey was modified to meet the objectives of was being studied. The researcher's objective is to understand the probable use, knowledge, attitude, and dependency of social media between citizens and first responders during disasters. Most studies to date focuses on citizens and emergency management use with limited knowledge on the role first responders can play. Both Su, Wardell, and Thorkilden (2012) and Martini (2014) focus of upper level emergency managers and staff with the exclusion of first responders at the operational.

There are advantages and disadvantages in using existing surveys to include whether it is validated, ensures clarity, and field tested. The modified survey instrument was pilot tested using ten college professors and ten first responder students in an upper level fire and emergency management class. None of their questionnaires were used as part of this study.

Research Questions

This study explored the following research question. Are there differences between first responders and citizens contributing to emergency management responsiveness using social media?

Hypotheses:

H0: There are no differences between first responders and citizens contributing to emergency management responsiveness using social media.

Ha: There are differences between first responders and citizens contributing to emergency management responsiveness using social media.

This study uses a similar survey developed by Su, Wardell, and Thorkilden (2012), which focused on social media use by upper level emergency managers at the national level, and Mariniti (2014) surveyed the State of Florida level. This researcher designed questions similar to their questions to determine whether there was a difference in use, type, and social media sites that first responders and citizens would use before, during, and after disasters. The participants were asked to select which social media site they would use, their level of skill, how would they use social media during disaster, and would they depend on and contribute to a centralized governmental social media site for information for disaster planning.

The study focuses primarily on first responders and citizen's attitudes and behaviors as to how best social media can utilize in planning for and communicating during disasters while being isolated from the general population. This study does seek to

draw a conclusion to that social media should be the only communication tool use during disasters, but provide understanding that there are greater needs for first responders and citizens input in how social media can serve them before, during, and after a disaster. Often time, emergency management operations lack staffing, to far remove from citizens and first responders to provide the greatest amount information and assistance, and unable to communicate with field personnel.

Population Study

This study focused on first responders and citizens living in Metropolitan Statistical Area (MSA) consisting of Miami-Dade, Broward, and West Palm Beaches Counties which has a population of 5.5 million people of various race, ethnicity, and cultures (United States Census Bureau, 2010). Monroe County was added with an additional 100,000 people due to its geographical location and part of the Florida Comprehensive Emergency Management Plan (FCEMP) which includes all four counties that is considered Region VII under the State disaster response initiatives. There are an estimated 16, 000 first responders in various capacity. All participants in this study were above the age of 18. The survey was sent to ten different fire departments, ten different civic organizations online at random on May 15, 2015 and ended June 15, 2015. The survey was also administered at six different community meetings during this time frame. Out of 162 surveys, 150 were completed. Seven surveys were not used because less than half of the questions were answered. The following tables provide demographic information for this population sample.

Table 1

Demographics: Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-21	1	.7	.7	.7
	22-27	37	24.7	24.7	25.3
	28-31	27	18.0	18.0	43.3
	34-39	31	20.7	20.7	64.0
	44-49	29	19.3	19.3	83.3
	50-older	25	16.7	16.7	100.0
	Total	150	100.0	100.0	

Table 2

Demographics: County

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Miami-Dade	34	22.7	22.7	22.7
	Broward	50	33.3	33.3	56.0
	Palm Beach	59	39.3	39.3	95.3
	Other	7	4.7	4.7	100.0
	Total	150	100.0	100.0	

Table 3

Demographics: Citizen or First Responder

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Citizen	73	48.7	48.7	48.7
	First Responder	77	51.3	51.3	100.0
	Total	150	100.0	100.0	

Table 4

Demographics: Careers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Citizen	55	36.7	36.7	36.7
	Emergency Manager	1	.7	.7	37.3
	First Responder	77	51.3	51.3	88.7
	Student	15	10.0	10.0	98.7
	Other	2	1.3	1.3	100.0
	Total	150	100.0	100.0	

Table 5

Demographics: Income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-$24,000	23	15.3	15.3	15.3
	$25,000-$50,000	23	15.3	15.3	30.7
	$51,000-$100,000	72	48.0	48.0	78.7
	$101,000 and more	32	21.3	21.3	100.0

Total	150	100.0	100.0

Data Collection Procedures

An explanatory designed was used for this study because there are limited or no studies to refer to. The focus was to provide an insight toward future studies involving citizens and first responders' use of social media before, during and after disasters as a two- way communication tool. The researcher sent questionnaire by email to first responders (fire, police) organizations within the MSA who sent the information to their members. Citizen organizations were request to participate through their chairperson. Citizens were also randomly asked to complete the survey questionnaire at various public locations. Several follow up emails were sent to participants to encourage as much input as possible.

All of the questionnaire's first page consists of a consent form explaining the purpose of the study and that participation was strictly volunteer. No incentive was offered and it was optional to sign the form. Participants had the opportunity to complete the survey on the Internet while others completed the survey in person. The survey was conducted between May 15 thru June 15, 2015 with an average time to complete was eight minutes. All participants who responded to the survey were included in the data analysis. The researcher used an explanatory study utilizing a questionnaire for data collection. The questions were written as it appears and coded with its number for efficiency.

Data Analysis Procedure

Data was evaluated to remove limited or blank responses. Pearson's Chi – Square test was used to evaluate sets of categorical data to observe whether there are differences between first responders and citizens in the expectations and use of social media. It also tests the reliability and independence of the test. The *Statistical Package for the Social Sciences* (SPSS) – PC Version 20.0 was used to analyze the data. A descriptive analyses utilizing frequencies, percentages, and inferential and post-hoc analyses were used for each survey response. The descriptive statistics were used to calculate frequencies, means, and standard deviations, and repeated measures.

Chi-Square Test of Independence were used to determine if there were significant differences in categorical data responses to first responders and citizens use in social media in emergency management effectiveness. The rankings of each of the types and use of social media tools by post hoc analysis was conducted on any significant results. The *t* test was used to compare the means value between the two groups. It was used to determine whether there was a difference between first responder and citizen's averages which was unlikely to have occurred because of random selections.

Reliability and Validity

The Cronbach Alpha Coefficient Test was used to measure the internal reliability and validity of the dependent variables: Importance, Reliability, and Competence. The test is a measurement of internal consistency and reliability with a .70 or greater is

considered acceptable in social science (Creswell, 2009). This test revealed a .77 score of importance, a .76 score of responsibility, and a .79 competence. Since the study's Cornbach Alpha was above the acceptable level, the instrument's internal liability and consistency was demonstrated and the survey can be considered reliable.

Ethical Consideration

All data procedures were followed to protect the integrity of the study and identity of the participants as established by the Institution Review Board (IRB) and dissertation committee. An informed consent statement was placed at the beginning of the online survey and during in person participation. Individuals were to withdraw from the study at any time. All were assigned a study identification number which was used throughout the study.

Chapter 4: Data Analysis

The purpose of this study is to determine whether there are differences between first responders' and citizens' use of social media in contributing to emergency management responsiveness during, before, and after a disaster using social media as a two-way communication tool in Miami-Dade, Broward, and West Palm Beach Counties. Monroe County was added as (Other) because it is part of FCEMP which includes all four counties that are considered Region VII under the state disaster response initiatives. An understanding of the differences between first responders and citizens contributing to emergency management responsiveness using social media provides an opportunity to enhance the performance of emergency management operations in disaster preparedness, mitigation, deployment, and recovery. It may reduce the loss of life and reduce property damage.

The chi-test of independence was used to test the independence of the two nominal/categorical variables indicating frequencies, percentages and inferential statistics. The *t* test was used to evaluate whether there were differences between first responders and citizens by comparing the means and variances of the two groups to determine the averages they unlikely to have occurred because of the random selection. The level of significance for both test was $p = .05$. The following tables provide the results of the chi-square test of independences and the *t* test results.

Null Hypothesis 1

Is there a difference between first responders' and citizens' Internet activities and use with handheld devices?

During disasters, handheld devices are generally the only means of communication available due to power outage. Normal activities of first responders and citizens includes instant message, email, checking information, watching television. The *t* test indicated that there was no difference (t = 1.734, df = 148, p = .085) social media Internet activities between first responders and citizens with hand held devices. These activities will indicate that they will use these devices to seek information when no other means of communication is available. Therefore, the null hypothesis is accepted.

Table 6

Internet Handheld

	Citizen - First Responder	N	Mean	Std. Deviation	Std. Error Mean
Internet handheld	Citizen	73	5.8219	3.00159	.35131
	First Responder	77	4.9870	2.89507	.32992

Table 7

Independent Samples Test

Null Hypothesis 2

There no differences between the first responder and citizen in ownership of handheld devices capable of accessing the Internet.

More than 95% of first responders and citizens who own a handheld device such as laptop, iPad, and cellular phones had the capability of accessing the Internet. The Chi-Square test indicated that there was no significant difference ($\chi(1) = 1.150$, df = 2, p =.563) between the two groups. Therefore, the null hypothesis is accepted.

Table 8

Ownership of Handheld Devices

		handhelds			
		yes	no	12.00	Total
Citizen - First Responder	Citizen	69	4	0	73
	First Responder	73	3	1	77
Total		142	7	1	150

Table 9

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.150[a]	2	.563
Likelihood Ratio	1.536	2	.464
Linear-by-Linear Association	.716	1	.397
N of Valid Cases	150		

[a]. 4 cells (66.7%) have expected count less than 5. The minimum expected count is .49.

Null Hypothesis 3

There no difference between the first responder and citizen in frequency of using the Internet from a handheld device.

The majority of first responders and citizens uses their handheld devices frequently ($\chi 1$) = 7.009, df = 4, p = .135) on a daily basis. This indicates that much information is shared or received through their handheld devices. The null hypothesis was accepted.

Table 10

Use of Handhelds

		how_often_handhelds					
				Several times			
		Never	Sometimes	a week	Daily	5.00	Total
Citizen – First Responder	Citizen	4	3	12	53	1	73
	First Responder	1	10	7	58	1	77
Total		5	13	19	111	2	150

Table 11

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.009[a]	4	.135
Likelihood Ratio	7.354	4	.118
Linear-by-Linear Association	.025	1	.875
N of Valid Cases	150		

[a]. 4 cells (40.0%) have expected count less than 5. The minimum expected count is .97.

Null Hypothesis 4

There is no difference between the first responder and citizen in skill level using course or learning management systems.

The observed number of first responders and citizens felt they were fairly skill in learning and using their handheld devices. There was no difference ($\chi(1)$) = 3.903, df = 4, p = .419 in first responders and citizen's skills in learning social media and management systems. The null hypothesis was accepted.

Table 12

Skill Levels

		Skill level					
		Not Very Skilled	Skilled	Fairly Skilled	Very Skilled	Expert	Total
Citizen – First Responder	Citizen	7	7	34	17	8	73
	First Responder	9	6	44	15	3	77
Total		16	13	78	32	11	150

Table 13

Chi-Square Tests

	Value	df	AsymptoticSignificance (2-sided)
Pearson Chi-Square	3.903[a]	4	.419

Likelihood Ratio	3.990	4	.407
Linear-by-Linear Association	1.514	1	.218
N of Valid Cases	150		

[a]. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.35.

Null Hypothesis 5

There is no difference between the first responder and citizen in frequency of using social networking websites such as Facebook, MySpace, Twitter, Instagram, LinkedIn.

The observed data revealed asked was there a difference and frequency (($\chi(1)$ = 9.742, df = 4, p = .045) of using social networking website such as Facebook, MySpace, Twitter, Instagram, and Linkedln. There was a difference. The observed data in moderate usage of social media both in first responders and citizens ranged from sometimes to daily. However, a significant number (*n-24)* indicates they do not access the Internet at all. The null hypothesis was accepted.

Table 14

Social Media Usage

		Social network usage					
		Never (do not use any social networking websites).	Never, I like my privacy and do not trust the government.	Sometimes	Several times per week.	Daily	Total
Citizen – First	Citizen	13	0	14	11	35	73

Responder	First Responder	11	4	20	19	23	77
Total		24	4	34	30	58	150

Table 15

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.742[a]	4	.045
Likelihood Ratio	11.330	4	.023
Linear-by-Linear Association	1.123	1	.289
N of Valid Cases	150		

[a]. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 1.95.

Null Hypothesis 6

There is a difference between the first responder and citizen in purpose of using social networking websites.

The dependent variable was to evaluate as to the purpose the use the social media. The majority indicated to stay in touch with friends, share photos and information, and participate in special interest groups. First responders in comparison and averaging of the two group, demonstrated no evidence that citizens different from that of first responder (t= 1.370, df = 148, p=.173) in their purpose in using social media. The null hypothesis was accepted.

Table 16

Purpose of Using Social Media

	Citizen – First Responder	N	Mean	Std. Deviation	Std. Error Mean
Purpose social. Networking	Citizen	73	2.5479	1.99333	.23330
sites	First Responder	77	2.1558	1.48736	.16950

Table 17

Independent Samples Test

Null Hypothesis 7

There is no difference between the first responder and citizen restrictions as to who had access to their profiles on social networking sites.

Do first responders and citizens restrict who has access to their profile on social networking sites? Most first responders and citizens place some restrictions (($\chi(1)$ = 6.232, df =3, p = .101) on allowing access of their profile on the Internet. This indicates concerns that personal information may be used inappropriately. The Chi-Square Test was used. The null hypothesis was accepted.

Table 18

Limiting or Restricting Access

		Limit or restrict access				
		I don't restrict access.	I place some restrictions on access.	I place restrictions on access	No restriction	Total
Citizen – First	Citizen	16	27	24	6	73
Responder	First Responder	19	35	12	10	76
Total		35	62	36	16	149

Table 19

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.232[a]	3	.101
Likelihood Ratio	6.320	3	.097
Linear-by-Linear Association	.457	1	.499
N of Valid Cases	149		

[a]. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.84.

Null Hypothesis 8

There is no difference between the first responder and citizen in use of social networking websites.

There was some difference which social media site ($t = 2.925$, $df = 148$, $p = .004$) between the two groups use of social media network site. Citizens seem to favor Facebook as their primary choice to visit, while first responder favors Facebook, Instagram, and Linkedln. However, Twitter is more suited for emergency communication. Anyone with a cell can receive tweets via text message and can be alert whether they are next to a computer or not. Other social media, including Facebook, requires a smart phone to access their sites (Chavez, Repas, & Stefaniak, 2010). Facebook is limited because it is passive. According to this study results, only a few respondents to the survey use Tweeter. The null hypothesis was accepted.

Table 20

Usage of Social Network Websites

	Citizen_First_Responder	N	Mean	Std. Deviation	Std. Error Mean
Use social network	Citizen	73	1.7123	1.24141	.14530
websites	First Responder	77	1.1818	.96963	.11050

Table 21

Independent Samples Test

Null Hypothesis 9

There is no difference between the first responder and citizen in comfort with technology.

The majority of first responders and citizens were comfortable with their use and changes in technology ((χ(1) = .497, df = 4, p =.974). A small percentage of respondents were skeptical of new technology and hesitant in using technology because of their privacy concerns (*n 29).* Chi-Square was used. The null hypothesis was accepted.

Table 22

Comfort With New Technologies

	Best describe you	Total

		I am skeptical of new technologies	I am hesitant about using new technologies because of my privacy.	Do not have an issue with new technologies once I learn it use.	Welcome new technologies.	other	
Citizen – First Responder	Citizen	3	12	25	29	4	73
	First Responder	4	10	26	32	5	77
Total		7	22	51	61	9	150

Table 23

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.497[a]	4	.974
Likelihood Ratio	.497	4	.974
Linear-by-Linear Association	.110	1	.741
N of Valid Cases	150		

[a.] 4 cells (40.0%) have expected count less than 5. The minimum expected count is 3.41.

Null Hypothesis 10

There is no difference between the first responder and citizen in use of social media for information during a disaster.

Just as many citizens and first responder have used social media during a disaster *(n 74)* as those who have never used it for information or notification *(n 76)* to determine a disaster status or for information gathering ((χ(1) = 2.655, df = 1, p = .103) Chi – Square test was used. The null hypothesis was accepted.

Table 24

Use of Social Media During Disaster

		Social media in disaster		
		yes	no	Total
Citizen- First Responder	Citizen	41	32	73
	First Responder	33	44	77
Total		74	76	150

Table 25

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.655[a]	1	.103		
Continuity Correction	2.149	1	.143		
Likelihood Ratio	2.663	1	.103		
Fisher's Exact Test				.141	.071
Linear-by-Linear Association	2.637	1	.104		
N of Valid Cases	150				

[a]. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 36.01.

[b]. Computed only for a 2x2 table

Null Hypothesis 11

There is no difference between the first responder and citizen in communication media used to get the most recent news, events, information, and education material.

There were no differences between citizens and first responders as a group in what communication media they would use to get the most recent use new, events, information, education material (t = .154, df =148, p = .878), and most would continue to rely on television and radio to acquire information, education and updates about and during a disaster. The null hypothesis was accepted.

Table 26

Communication Media Used

	Citizen – First Responder	N	Mean	Std. Deviation	Std. Error Mean
Communication	Citizen	73	2.0822	1.19900	.14033
media used	First Responder	77	2.0519	1.20193	.13697

Table 27

Null Hypothesis 12

Independent Sample Test

There is no difference between the first responder and citizen in news media relied on to provide the most current information when the last disaster—local, national or international—occurred.

What news media they relied on to provide the most current information when the last disaster struck (local, national or international. Most first responders and citizens relied on televisions and radio to provide them with information and updates about disasters. Some received information and updates through social media (t = 1.859, df = 148, p = .065). The null hypothesis was accepted.

Table 28

News Media Relied Upon

	Citizen – First Responder	N	Mean	Std. Deviation	Std. Error Mean
News media relied on	Citizen	73	1.5068	.92980	.10883
	First Responder	77	1.2468	.78062	.08896

Table 29

Independent Samples Test

Null Hypothesis 13

There is no difference between the first responder and citizen in frequency of times they received an alert, warning or public service message from local government on iPad, Smart Phone or portable device.

Fifty-five percent of first responders and citizens (*n* = 81) have received an alert, warning, or public service message from their local or State emergency management agency. But 45% have never received notification or information about impending disaster (*n* = 69). The chi- square test of independence indicates ((χ(1)= 8.153, df =4, p = .086). The null hypothesis was accepted.

Table 30

Frequency of Alerts Received

		Times received an alert					
		Never	Never, my community does not have this system in place	A few times	Often	Regularly	Total
Citizen – First Responder	Citizen	20	5	37	9	2	73
	First Responder	35	9	24	7	2	77
Total		55	14	61	16	4	150

Table 31

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.153[a]	4	.086
Likelihood Ratio	8.238	4	.083
Linear-by-Linear Association	5.541	1	.019
N of Valid Cases	150		

[a]. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 1.95.

Null Hypothesis 14

There is no difference between the first responder and citizen in best use of social media before, during and after a disaster.

As a group most first responders and citizens indicates would best be used for providing in preparation (75%), providing information (72%) allows for real time information, returning a community back to normal (56%), providing information on safe area (54%), allow them to help others (54%), allow them to provide feedback and have two-way communication ability with their government official ($t = .193$, $df = 148$, $p = .848$). The null hypothesis was accepted.

Table 32

Best Use of Social Media

	Citizen – First Responder	N	Mean	Std. Deviation	Std. Error Mean
Best use social media	Citizen	73	3.0000	1.44338	.16893
	First Responder	77	2.9481	1.82739	.20825

Table 33

Independent Samples Test

Null Hypothesis 15

There is no difference between the first responder and citizen in best use of a two-way communication social media system to provide education, information, and assistance to serve public safety needs.

This question was a follow up to null hypothesis as how best to use**.** More than 88% of the respondents, both first responders and citizens, felt that social media will be of no help or will make any difference during disasters (t = 1.706, df 148, p = 090). The null hypothesis was accepted.

Table 34

Best Use of Two-Way Social Media

	Citizen – First Responder	N	Mean	Std. Deviation	Std. Error Mean
Best two way social media	Citizen	73	6.7808	2.86864	.33575
	First Responder	77	5.9351	3.18441	.36290

Table 35

Independent Samples Test

Null Hypothesis 16

There is no difference between the first responder and citizen in intended participation in a centralized social media site sponsored by the government specifically for public readiness and safety during disasters and crisis.

What was their intended participation in a centralized social media site sponsored by the government specifically for public readiness and safety during disasters and

crises? Chi-square test of independence reveals that 50% of respondents (n = 75) would support and intend to participate in a centralized government sponsored social media system for public readiness and public safety during disasters (($\chi(1) = 5.346$, df = 2, p = .069). Fifty percent of the respondents (n = 75) were undecided or stated they will not participate. The null hypothesis was accepted.

Table 36

Intended Participation in Centralized Social Media

		Centralized Social Media Recoded			
		yes	no	undecided	Total
Citizen – First Responder	Citizen	40	5	28	73
	First Responder	35	1	41	77
Total		75	6	69	150

Table 37

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.346[a]	2	.069
Likelihood Ratio	5.602	2	.061
Linear-by-Linear Association	2.280	1	.131
N of Valid Cases	150		

[a]. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 2.92.

Chapter 5: Conclusion and Recommendations

The purpose of this study was to determine whether there is a difference between first responders' and citizens' use of social media in contributing to emergency management responsiveness during disasters. Little or no research has been done on first responders' attitude, use, and role with social media as a communication tool in disasters. Ironically, they deal with lower level emergencies each day with ample resources and skills. Furthermore, only moderate studies have been done on citizens' use of social media during disasters whereas many gaps and lack of understanding still exist on how best it can be utilized. Factors such as cost, staffing, politics, policy issues, wholesale system changes, trust, training, and so forth seem to be the prevailing issues in merging social media into emergency management operations. Phases of a disaster do not have a beginning or end. Actions taken in one phase of emergency management are interdependent with activities in other phases and have an impact on activities in other phases, which may ensure limited life loss and property damage.

In analyzing the data on citizens and first responders in South Florida, 88% of respondents felt social media will not make a difference during disasters, and a majority of the two groups indicated that government centralized social media sites may be of little use or they were undecided. Most would use social media for preparation and recovery with a small number wanting two-way communication with emergency management. Chavez, Repas, and Stefaniak (2010) conclude that social media will allow government

to communicate with the public, but will not replace traditional emergency management systems and communication strategies. At best, social media can become complementary to existing emergency management efforts. The data collected indicates that there are only minor differences between citizens and first responders in their use of social media websites, expectations, and their role as it relates to emergency management during a disaster.

However, Woods (2013) argues that social media have created new opportunities for emergency management. Keim and Noji (2011) contend that changing and evolving networked communication systems now offer the public ever-increasing information access. Social media has revolutionized communication systems and networks and have presented a whole new paradigm for communicating that allows people from around the world to interact with each in real time sharing of information and resources. Ownership of handheld devices that can access the Internet, skill levels, and how they would use social media are also equal among the group as a whole. Each group would use social media for preparedness and recovery; however, it appears that there is little or no interest in providing feedback to emergency management officials. This may be due to the agencies' failure to build relationships among the social networks available.

First responders and citizens are closer to situation and more in need of immediate information as well as having the ability to provide real time updates of their conditions and situations. Understanding their roles and how to use these resources can be beneficial to emergency management organizations. Peterson (2014) states that the coordination of

an effective response system to a disaster requires good intel to allow for accurate deployment and immediate care for those who are in need of assistance. With the use of thousands of possible recon team members—the public—information can be received and given in real time to citizens. Social media platforms and applications as a communication could give that capability. Public safety and emergency managers can then focus resources to the right area, provide detailed information and support to the right people, and eliminate the costly duplication of efforts. Leaders and managers in the field of emergency services where the passage of time yields more capability due to some combination of progress in the related body of knowledge, or significant technology advances, emergency management functions are facing increasingly severe challenges. The main challenge is how to use the public and first responders through social media to be able to better help themselves during a disaster or crisis with accurate information (Woodcock, 2009). Based on the data collection, challenges still exist.

This research did not attempt to approve or disapprove whether or not in emergency management social media should be a communication tool in disaster and crisis preparedness, deployment and recovery efforts. The focus was on whether or not there are differences between first responders and citizens contributing to emergency management responsiveness using social media. The social science challenges and data and visual analytic challenges features were intentionally left out as they relate to social roles in disaster and crisis incidents. Research papers, governmental and organizational studies, and social media case studies were reviewed to determine whether social media

can augment and support emergency management communication goals and objectives with the public during a disaster. Social media use and need has been proven during Hurricane Katrina, an earthquake in Haiti, Hurricane Sandy, tsunamis in Japan and other areas of the United States and the world. However, in the study of lower level first responders and citizen's suggestions are lacking as to what best served them.

Significance of the Study

This researcher found that social media can become a useful communication tool of emergency management in the future due to its ability to allow for personal interaction, real time information and pictures, and easy access once they understand how the end users will make use of the desired system in place. Analyses of the data have demonstrated there is little difference between citizens and first responders use, type and expectations of social media role in emergency management responsiveness. It indicates that there is a need for first responders' and citizens' involvement in the planning and implementation phases in order for social media to effectively and efficiently to be used as a communication tool for the public.

Even in a small geographic region, such as South Florida, there are multiple city governments with emergency coordinators and political leaders with their own thoughts as to how they will use social media before, during, and after a disaster. Some emergency managers and public safety officials are on board, but need a better understanding of technology and its application. What is needed is a joint effort between the various social media platforms and governments to close the gap to a single platform for dialogue and

interaction. However, most important is that citizens and first responders directly participate in the development and design of social media platforms to gain buy in and support. The data also suggest that social media use in South Florida is fragmented and information cannot reach the public over the various social media websites simultaneously.

Limitation of Study

Social media use in South Florida has not been explored as to how it can be beneficial to emergency management in providing resources and assistance to the citizens and first responders. Even though South Florida has experienced a number of hurricane disasters in the past, it has not been to enough to change the traditional means of communication between the public and first responders. The counties under study were multicultural with different meaning to the various. Other limitations may include:

- A lack of understanding of emergency management's role and responsibility due to the lack of the agency involvement with the public during non-emergencies.
- The structure of South Florida's emergency management system is decentralized with each city and county agency independently operating.
- The random sample survey size of 150 respondents may have not been large enough to form a generalization of the differences between first responders and citizens.

- There exists a lack of understanding and education on how social media can be used during disasters by citizens and first responders.

This study was only a snapshot of what the differences are between first responders and citizens use, expectations, and role in utilizing social media as a communication tool and support emergency management officials in providing assistance.

Conclusion

The first effort of having a collaborated social media information center where all information comes in to one particular site and official information goes out in a unified (one voice) manner. Brooks (2014) identified a Virtual Operations Support Team (VOST), which is a force multiplier in collecting data and pushing out information to survivors. It gives the Red Cross the ability to collect, analyze, and respond to social media information through its Digital Operations Center. The Digital Operations Center, which was established in partnership with Dell and is the first social media center devoted to humanitarian relief. The Digital Operations Center monitors the Red Cross' Twitter and Facebook accounts and keyword searches of publicly-available tweets and Facebook posts. It worked well during Hurricane Sandy and is considered to be a promising tool to have once other improvements are made.

Lindsey (2011) states that many of these applications remain speculative and in the infancy stage. Most emergency management organizations only use social media for information dissemination. In his report to Congress, Lindsey concluded that social

media appear to be making inroads to emergency management by being accurate, reliable, and providing timely information before during, and after an incident. But, further research and examination are needed to draw a reliable conclusion.

Recommendations

What has been determined from this limited research is that the social media industry has a corporate social responsibility in assisting the public, in the time of disaster and crisis, by establishing a unified social media platform for public use. More research is definitely needed as to what the best approach is to accomplish this goal, especially among the third world countries, due to the advancement of technology and lower cost. There is evidence that households have eliminated the home telephone for cellular phones, iPads and other handheld devices to communicate with each other.

Spicer (2013) states that it is equally important for homeland security and emergency response leaders, and in particular the public information practitioners, to remain engaged in technologies to help determine what emerging trends might add value to the support of our citizens and communities in a time of disaster. Hughes (2012) concludes that emergency response agencies, which operate as command-and-control organizations, push information to members of the public with too few mechanisms to support communication flowing back.

Even though, the public is demanding more and more information from public safety officials and first responders through social sites, there may not be an infrastructure in place to effectively handle the volume of calls during emergencies.

Existing emergency processes remain in effect and social media can become a component of the overall system.

Disasters have no boundaries nor should the program that is eventually implemented. Social media is an important tool in disaster management despite its limitations. However, care must be given when developing a social media system that does not foster unrealistic expectation by the public and first responders. They must be a part of the developmental process by providing input as to how social media can be a value to them in all phases of emergency management disaster efforts. Disaster management is the creation of plans through which communities reduce vulnerability to hazards and cope with disasters. It does not avert or eliminate threats, but instead it focuses on creating plans to decrease the impact of disasters. Therefore, there must be a clear and concise understanding between the two.

Emergency management refers to the day-to-day activities that fire or police departments perform that are part of their planned, anticipated, budgeted daily routine. In addition to being part of the planned daily routine, which does not upset the overall patterns of a community, these types of events do not generate unmet organizational needs. Disaster management does refer to those situations, events, or occasions when a community's resources are not sufficient, and unmet social needs are generated. As social life becomes disrupted for much of the community, and the community must reach to the outside environment for additional resources, first responders and citizens may be a part of the communication equation through social media to effectively utilizing those

resources. It is also recommended that there be more studies on existing theories dealing with human behaviors as they relate to disasters. Today's human behavior theories may not be applicable to how people react or communicate in a technological age.

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Appendix A

Consent Form

You are invited to participate in a research study regarding should social media be a communication tool in disaster and crisis mitigation, preparedness, response, and recovery efforts? This study is an attempt to evaluate how social media can be an effective tool used in a two-way information exchange from the public during emergency management preparedness, mitigation and deployment of resources. It is also being an attempt to measure whether citizens living in South Florida may rely on the use of social media for news and updates before, during and after a disaster. We are asking that you, whether you are an emergency responder, emergency managers or regular citizen living in South Florida, please complete the attached survey questionnaire.

This research will be an attempt to explain how the coordination of an effective social media response system to a disaster requires good intelligence to be obtained to allow accurate deployment and immediate care for those who are in need of assistance. With the use of thousands of possible recon teams, the public information can be received and given in real time to citizens. The social media platforms and applications as a communication would give that capability. Public safety and emergency managers can then focus resources to the right areas, provide detailed information and support to the right people, and eliminate the costly duplication of efforts. The objective of this study is to demonstrate is there a need for improve and centralize communication social media system for disaster preparedness, mitigation, response and recovery during a crisis.

You are asked to complete the attached survey instrument which takes approximately five minutes. This study does not involve any risk of harm to you. No identifying information that might jeopardize confidentiality will be collected. All information will be kept confidential and no information that would reveal participants' identities will be shared with anyone who is not directly involved with this research study. Research records will be stored securely and only the primary researchers will have access to the records.

Participation in this research study is voluntary and you have the right to withdraw or refuse to participate entirely without penalty or reprisal. Completion and return of the survey implies that you agree to participate and that your data may be used in this research.

If you have questions about this study, please feel free to contact my Dissertation Chairperson, Dr. Gordon Haley, DBA Professor, St Thomas University, Leadership Institute, 16401 NW 37th Avenue Miami Gardens, FL 33054 Tel: ghaley@stu.edu.

Thank you in advance for your participation.

Sincerely, Arthur L. Holmes, Sr., Doctoral Candidate

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Appendix B

Public Safety

Emergency Management: Can social media be a communication tool in disaster and crisis mitigation, preparedness, response, and recovery efforts in South Florida?

SURVEY

INSTRUCTIONS

The following questions ask about your use of social media and whether, in your opinion, it would be useful before, during and after a major disaster i.e. hurricane, flood, tornados, etc. It is important to get accurate data on what citizens, emergency managers, first responders, public safety officials are currently doing in their communities to prepare, respond and mitigate disasters by using social media as a two-way communication tool to reach the masses. Please answer the survey questions as honestly and to the best of your ability as possible. Your answers will be kept private, and will in no way be connected to you or your organization. A signature on this survey is optional and you must be 18 years old and above to participate.

Section 1

Which of these Internet activities do you do from your handheld device? Check all that apply.

[] a. Instant message

[] b. E-mail

[] c. Follow or update micro-blogs (Twitter, etc.)

[] d. Use social networking websites (Facebook, MySpace, LinkedIn, etc.)

[] e. Check information

[] f. Read or contribute to blogs

[] g. Conduct personal business

[] h. Use Internet photo sites

[] I. Watch mobile TV

[] j. Download/stream music

[] k. Download or watch videos online

[] l. Download or play games online

Do you own a handheld device that is capable of accessing the Internet (whether or not you use that capability)? Examples include iPhone, BlackBerry, other Internet-capable cell phone, iPod touch, PDA, Pocket PC, etc.

[] No,

[] Yes.

How often do you use the Internet from your handheld device?

[] Never

[] Sometimes

[] Several times per week

[] Daily.

What is your skill level using course or learning management systems?

[] Not skilled

[] Not very skilled

[] Fairly skilled

[] Very skilled

[] Expert

How often do you use social networking websites such as Facebook, MySpace, Twitter, Instagram, LinkedIn, etc.?

[] Never (do not use any social networking websites).

[] Never, I like my privacy and do not trust the government.

[] Sometimes

[] Several times per week.

[] Daily.

How do you use social networking websites? Check all that apply.

[] a. Stay in touch with friends

[] b. Make new friends I have never met in person

[] c. Find out more about people (I may or may not have met)

[] d. As a forum to express my opinions and views

[] e. Share photos, music, videos, or other work

[] f. For professional activities (job networking, etc.)

[] g. Participate in special-interest groups

[] h. Play games

Do you limit or restrict who has access to your profiles on social networking sites?

[] I don't restrict access.

[] I place some restrictions on access.

[] I place restrictions on access.

[] No restriction

Which of the following social networking websites do you use? Check all that apply.

[] a. Twitter

[] b. Facebook

[] c. LinkedIn

[] d. MySpace

[] e. Instagram

[] f. Flickr

[] g. Other

Which of the following best describes you?

() I am skeptical of new technologies.

() I am hesitant about using new technologies because of my privacy.

() I do not have an issue with new technologies once I learn it use.

() I welcome new technologies.

[] Others

Section 2 -

Have you used social media for information during a disaster?

[] Yes

[] No

Which communication media do you use to get the most recent news, events, information, education material, etc.? Check all that apply.

[] Newspaper

[] Television

[] Radio

[] Social Media

[] Cellular Phone

When the last disaster struck (local, national or international) which news media did you rely on to provide the most current information?

[] Newspaper

[] Television

[] Radio

[] Social Media

[] Cellular Phone

How many times have you received an alert, warning or public service message from your local government on your IPad, Smart Phone or portable device?

[] Never

[] Never, my community does not have this system in place

[] A few times

[] Often

[] Regularly

How best can social media serve you if it is being used by your community emergency management agency before, during and after a disaster? Check all that apply.

[] Preparation.

[] Mitigating the incident.

[] Deploying the proper resources to help me.

[] Help my community return to normal by providing real-time updates on what to do.

[] Social media will be no help at all.

If your community had a two-way communication social media system to provide education, information, assistance, etc., how best would it serve your public safety needs? Check all boxes that apply.

[] It will provide me with all the information I need to become prepared for an emergency.

[] It will help me find safe areas during an emergency

[] It will allow me help others where it is needed.

[] It will assist me in knowing what is happening in real-time.

[] It will allow for faster assistance to the people most affected.

[] It will allow me to provide feedback and pictures of my conditions and surrounding.

[] I can be located quickly by GPS.

[] I will be having two-way contact with family, friends and public safety officials.

[] It will help my community to return to normal quicker.

[] The use of social media will not make a difference.

[] I would not support it because it is too expensive to staff and maintain.

If there were a centralized social media site sponsored by the government specifically for public readiness and safety during disasters and crisis, would you participate?

[] Yes

[] Yes, a dedicated centralize social media site is needed.

[] Maybe

[] No, I do not trust the government

[] undecided

Section 3

What is your age?

[] 18 – 21 [] 34 – 44

[] 22 – 27 [] 45 – 49

[] 28 – 33 [] 50 - older

What County do you live in?

[] Miami-Dade

[] Broward

[] Palm Beach

[] Monroe

[] Others

Are you a

[] Citizen

[] Emergency Manager

[] First Responder (fire fighter, Police Officer)

[] Student

[] Others

What is your yearly income?

[] 0 - $24,000

[] $25,000 - $50,000

[] $51,000 - $100,000

[] $101,000 or more

Your name (Optional) _____

Appendix C

Dissertation Manual Acknowledgement Form

By my signature below, I __Arthur Holmes_ assert that I have read the dissertation publication manual, that my dissertation complies with the University's published dissertation standards and guidelines, and that I am solely responsible for any discrepancies between my dissertation and the publication manual that may result in my dissertation being returned by the library for failure to adhere to the published standards and guidelines within the dissertation manual.

Chair

2/11/16 2/11/16

Signature of Author