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THE EFFECT OF SOCIAL MEDIA ON CROWDSOURCING INVESTIGATION

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ABSTRACT

In this thesis, I present a different way of viewing how social media effects crowdsourcing investigations. I explored the Boston Marathon Bombing case and analyzed tweets that were collected during the crisis. I focused on the key participants, the national media, the police, and Twitter, to explain how important it is for them to understand to role of social media in order to prevent reporting false information. From the data, I indicated that there is a lack of understanding by the national media and the police to use social media as an investigation tool. This demonstrates that although social media has a high potential to be a useful tool in investigating, it will only create controversy, if not used correctly. This research suggests that there should be precaution when using social media in future investigations to prevent mistakes.

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Chapter 1

Introduction

With the rise of social media, there have been numerous changes in policing, including the growth of crowdsourcing or citizen journalism. The emergence of social media has affected how citizens obtain news and communicate with one another. The use of social media is not limited to younger generations, but has expanded to include older generations as well. Regardless of age or education, social networking is expansive, as evidenced through data collected by the Pew Research Center's Internet Project. As shown in Figure 1, even people who are 50 years or older use social networking sites extensively which shows the wide scope of social media.

Figure 1. Use of Social Networking Sites (Pew Research Center)

Who uses social networking sites	
<i>% of internet users within each group who use social networking sites</i>	
<i>All internet users</i>	74%
a Men	72
b Women	76
a 18-29	89 ^{cd}
b 30-49	82 ^{cd}
c 50-64	65 ^d
d 65+	49
a High school grad or less	72
b Some college	78
c College+	73
a Less than \$30,000/yr	79
b \$30,000-\$49,999	73
c \$50,000-\$74,999	70
d \$75,000+	78

Pew Research Center's Internet Project January Omnibus Survey, January 23-26, 2014.
 Note: Percentages marked with a superscript letter (e.g., ^a) indicate a statistically significant difference between that row and the row designated by that superscript letter, among categories of each demographic characteristic (e.g., age).

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Technological developments have increased the ease with which people are able to communicate and share experiences with others. Within seconds, users can share pictures, videos, or other content through different social media platforms with acquaintances worldwide. This public involvement on social media is called a social feedback mechanism. It is the process of people interacting amongst each other by sharing and checking information. Social media sites, like Twitter, provide constant new information that can be accessed from all over the world. Due to the incredibly rapid growth of social media within the past decade, it is of interest to see its impact in different situations. I believe the role of social media has grown from traditional content sharing to include other purposes such as instant informing and even as a live feed during crisis.

Crowdsourcing has introduced a new way of investigating. Crowdsourcing is an “emerging and powerful information procurement paradigm” that plays “important roles in data mining” (Xintong et al). Requesters, those who ask for information such as the police, “decompose the whole task into several small tasks and push them to the crowd” (Xintong et al). For example, the police would ask the crowd to send them pictures, videos or any evidence of the scene to aid the investigation. The advancement of technology has also had an effect on crowdsourcing investigations by allowing people to use social media networks to share information. This transparent method of investigation attracts everyday citizens to participate and allows police to easily obtain information from many different sources. Furthermore, some believe that crowdsourcing is a powerful tool because it can harness the help of large numbers of volunteers in certain investigations (Ball). Situations where social media and crowdsourcing have played a big role include the Boston Marathon Bombing and the Haiti earthquake. However, like all developing technologies, social media is not without its perils. There are many problems regarding the use of social media for crowdsourcing investigations.

In my thesis, I will be examining the problems that arise from misunderstandings between the key participants involved in crowdsourcing investigations: the police, social media users, and national news outlets. As the investigator and the informant, respectively, the police and national media are the credible

sources that the public relies on for correct information. Through my literature review and qualitative data analysis, I will prove that although social media is a good tool for crowdsourcing investigations, there still needs to be much more understanding of social media in order to effectively crowdsource an investigation.

The purpose of this study is to build upon existing research on the effectiveness of social media on crowdsourcing investigations with an emphasis on roles of the key participants. I hope to enhance the understanding of the flaws associated with crowdsourcing investigations in order to lessen future mistakes. Through my literature review, I will explain how social media influences crowdsourcing as well as explain the need for more understanding by the main participants. Then, through my data, I will further prove that the power of the crowd is greater than that of the national media and police.

Chapter 2

Background

On April 15, 2013, two pressure cooker bombs exploded during the 117th running of the Boston Marathon. Around 2:49 p.m., with over 5,600 runners still in the race, the two bombs went off at the finish line killing three spectators and injuring more than 260 people (Tapia, LaLone, and Kim). Following four days of much speculation and false leads, law enforcement officials finally identified the two suspects as Tamerlan and Dzhokhar Tsarnaev.

As quickly as ten minutes after the detonation, a Boston Police Department (BPD) commander called for the use of social media to communicate with the public. The BPD turned to Twitter to ask the public for assistance by sharing any information, pictures or videos they had of the event (Davis et al). As the investigation continued, much false information was reported. On April 17, CNN falsely reported that an arrest had been made in the case, which was retweeted more than 5,000 times (Davis et al). Moreover, as people began to conduct their own investigations online with the evidence posted on social media, rumors started forming. On April 18, around 5:10 p.m., the FBI released photos of two suspects. By 9 p.m. that day, there were Reddit threads that linked one of the identification photos to Sunil Tripathi, a student who had been missing for a month. By the morning of April 19th around 8:24 a.m., there were reports released that Sunil Tripathi was not a suspect and the real names of the true suspects were released (Davis et al). Rumors that flooded those four days also included conspiracy theories, reports of false victims, and even accusations North Korean involvement. On April 19th, the FBI released pictures of the two actual suspects, Tamerlan Tsarnaev and Dzhokhar Tsarnaev. A manhunt ensued, which included the death of one of the suspects, Tamerlan Tsarnaev, and ended when the other suspect, Dzhokhar Tsarnaev, was captured on the evening of April 19th. Figure 2 below explains a more detailed timeline of the Boston Marathon Bombing event.

Figure 2 Timeline of Boston Marathon Bombing (Ehns and Bunker)

Table 2. Timeline of the disaster event – derived from (Black 2013; Castillo and Botelho 2013; Hanstock 2013)

Boston Marathon Bombing – Monday – 15.04.2013			
2:49 pm	Two explosions near the finish line, only a few seconds apart.	3:39 pm	Boston Police confirms event on Twitter.
2:50 pm	First tweets from members of the public.	4:02 pm	Boston Police confirms two dead and 12 injured persons.
2:57 pm	Twitter feed of the Boston Globe reports two explosions.	4:12 pm	Boston Police responds to what is assumed to be a third explosion at the JFK Library.
3:14 pm	Video of the explosions is shared online.	5:01 pm	Mobile phone service in downtown Boston turned off.
3:15 pm	Runners, still on the course, are stopped.	8:49 pm	It is announced that the FBI has taken over the investigation.
Tracing main suspects – Thursday to Friday – 18.04.2013 & 19.04.2013			
ca. 5 pm	FBI releases pictures of two suspects.	ca. 6 pm	Lockdown of Boston area slightly lifted.
ca. 11pm	University police officer at MIT shot, police responds to this call.	ca. 7 pm	Resident discovers possible location of suspect.
ca. 1am	Police tracking hijacked car with its in-built GPS. Fire fight with suspects. One suspect shot.	7:30 pm	Police surrounds location of suspect.
ca. 2am	Police urge residents of Watertown to stay inside and turn off mobile phones.	8:43 pm	Suspect taken into custody.
ca. 8am	Suspects identified.	8:45 pm	Police announces over Twitter that suspect is in custody.

Chapter 3

Key Participants

In order to understand who and what influenced the investigation, it is important to recognize and define the key participants of crowdsourcing investigations.

The Police

The main police involved in this crisis were the FBI and the Boston Police Department. Their use of Twitter throughout the four days previous to the capture of the suspects was significant in allowing the public to receive information from the most credible sources.

The National Media

The national media includes any news outlet networks that were involved in reporting the Boston Marathon Bombing. For example, CNN, MSNBC, The Boston Globe, and CBS were important national news outlets.

Social Media

Social media is “a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0 and that allow the creation and exchange of user generate content” (Effing et al). It is important to note that social media is different from Web 2.0, which is “a platform whereby content and applications are no longer created and published by individuals, but instead are continuously modified by all users in a participatory and collaborative fashion” (Effing et al). Compared to Web 2.0, social media is a more developed platform that has higher user participation. Social media allows users to engage with one another and share their own contents. In addition to these characteristics, the easy accessibility, widescale interaction and rapid content dissemination contributes to the prevalence of social media usage.

Social media is important to understand because it facilitated a crowdsourcing investigation during this national crisis. Examples of social media platforms include Twitter, Reddit, 4Chan and Facebook. It is becoming an “established feature of crisis events” where “affected people are turning to these sites to seek information, and emergency responders have begun to incorporate them into communication strategies” (Starbird et al). It is the medium by which bystanders can share pictures, videos, and information with the public. It is also a platform in which the online community can participate in learning and conducting their own investigation.

Twitter

Twitter is a major social media network that aims to “give everyone the power to create and share ideas and information instantly, without barriers” (Twitter). It is one of the easiest and fastest mediums to share and receive information in a real-time manner. Twitter allows users to post short messages, up to 140 characters, that can be read by any other users (Huberman et al). Unlike Facebook or Linked In, Twitter users can read anyone’s messages because it does not require follower reciprocation to view messages if the account is public. Another attractive feature of Twitter is that the users can easily scan through hundreds of tweets by just scrolling down the page. Also, since Twitter has a cap of 140 characters, it is convenient for users to quickly read through the short messages.

Twitter also has features of hashtags (#) and retweets. Hashtags are used to create a label for the chosen words in a Tweet. These labels create categories that make it easier for users to search for tweets containing that same keyword. For example, for Boston Marathon Bombing, people used hashtags such as #bostonmarathonbombing, #prayforboston, and #boston to categorize their tweets and make it convenient for other users to search and view all relevant tweets.

Retweeting is re-posting another user’s tweet to your own account. It allows users to quickly share others’ messages. Twitter also has enabled annotation features, which allow people

to comment on the message that they retweeted. For example, people would retweet if they agree with the comments, giving them the ability to spread information to their followers. According to a study, 50% of retweets occur in the first hour after a tweet is shared and 75% within the first day during crisis events (Huberman et al). This shows how quickly information can be spread in a short period of time.

The Trends is another helpful feature that the users can use to see what popular topics are being discussed. It is determined by how many people are talking about certain subject through the number of hashtags. The list of what is trending helps people to discover the breaking news that are emerging on Twitter.

Reddit

Reddit is “a website where the delivery format, memory devices, arrangement of discussion threads and categorization, and content style all work towards building a distinct culture of sharing information” (Potts and Harrison). On Reddit, people are able to share content and converse with one another. Users on Reddit are provided with ways to participate in the discussions by having the authority to vote on the contents which increases the popularity forum by how many votes it has. Reddit is a different form of social media unlike Twitter because it fosters a more open platform that provides an extended space for sharing and discussion. It has a hierarchical and ordered structure as the threads move up and down in ranking. Reddit describes the work space as one in which “community members are constantly tinkering and contributing features, bug fixes and translations back to the site” (Potts and Harrison). This represents a social feedback mechanism because people converse with one another to give feedback and contribute to the thread.

Reddit was one of the major social media platforms used by the public to conduct their own investigations. Reddit users gathered information about the possible suspects and linked the

profile of Sunil Tripathi on a thread. This caused a big controversy as it caused the false accusation of Sunil Tripathi.

Chapter 4

Theory

Today, the ways of investigating and responding to disasters have been impacted by the platforms that allow for increased public involvement of those outside of the geographic region. The internet “has already begun to change official investigation by serving as a central hub of information that could allow responders to survey all relevant data from nearly anywhere in the world at any time” (Tapia, LaLone, and Kim). Moreover, with the maturation of social media, it further benefits the information sharing through easy accessibility and rapid message delivery. It is also interesting to see the newfound power of the public’s information on how much it can influence investigations. The public used social media to provide feedback either in support or against the information. In this paper, I want to examine the role of a social feedback mechanism and in what ways the police and the media utilize it.

Although there was much positive and helpful evidence presented, there was also false information that arose from this crowdsourced investigation. False information hinders the credibility of police and the media. Through my findings in the literature review, I will argue that there needs to be a better understanding of the way police and national media use social media. This understanding would work to make crowdsourcing investigations more effective and accurate.

I hypothesize that:

- 1) There is a social feedback mechanism among social media, policing and the national media. During the time of the crisis, social media played a major role in crowdsourcing the investigation by allowing people to converse online with one another to share ideas.

- 2) Although there is a social feedback mechanism, police and the national media do not understand the mechanism well. If the major sources do not have a fundamental understanding of the medium, then problems will constantly occur.

I believe that the key to effective crowdsourcing lies in the police and the national media understanding how a social feedback mechanism works. If my predictions are supported by the data, then we know that in order to enhance the accuracy of crowdsourcing through social media, we need to recognize more deeply what social media is. This will bring attention to the police and the national media to be more accurate and precise in taking information from social media. However, if my predictions are proven wrong, there should be further research on why crowdsourcing investigations through social media are not always proven to be successful. Through my data analysis, I will present whether or not comprehending a social feedback mechanism is a factor in providing accurate information.

Chapter 5

Literature Review

History and examples of crowdsourcing investigation using social media

Crowdsourcing has long been employed as a tool in police investigations. Early examples of crowds assisting the police are seen through police wanted posters, and crime tip lines (Tapia, LaLone and Kim). Police seek help in looking for missing persons, identifying criminals or gathering information about the crimes. The evolution of wanted posters to crime tip lines was caused by the availability of telephones, followed by television shows such as America's Most Wanted (Tapia, LaLone and Kim). Today, social media has provided a wider platform for the public to contribute when needed. Other early examples of web user participation include Wikipedia, which was "developed by people performing tasks" (Olson and Rosacker). By implementing the public's participation on the web, it has allowed a wider scale of participants to contribute and bring together greater knowledge. Recently, crowdsourcing has been effective in different situations such as disaster response, emergency response or crisis management. Examples include the Haiti earthquake, Japan earthquake, and the BP oil spill. Other examples are described below:

In 2007, when the Virginia Tech shooting occurred, people used social media sites to determine who the victims of the shooting were. The online function on Facebook connected tens of thousands of Virginia Tech students, making it easier to detect who was safe by their online activity (Palen). Through the use of social media, the students were able to self-police and provide information to the investigators.

Moreover, in the 2011 Vancouver riot, the crowd participated in the investigation of participants of the riots. Within ten minutes of the end of the hockey game, people used social media to gather, repost and respond to photographs, personal information, and other evidence (Schneider and Trottier). People created and posted on the "Vancouver Riot Pics: Post Your Photos" Facebook page which reached over

seventy thousand likes on the day after the riot (Schneider and Trottier). Using the information, the police were able to identify and arrest the rioters.

These examples demonstrate the power of crowdsourcing and showcase the potential of social media as a possible investigation tool. One of the largest crowdsourcing investigation through social media was shown through the Boston Marathon Bombing case, which I will explain later in this paper.

How social media influences crowdsourcing

The scope of crowdsourcing has expanded with the development and the increased use of technology. According to the Pew Research Center, as of 2014, more than 74% of online adults use social networking sites (Pew Research Center). Some characteristics of social networking sites that make it attractive for people to use for crowdsourcing include better-connected networks, easier interaction amongst people, and faster information sharing. Although there are many other mediums in which people can obtain information and share personal knowledge such as TV and radio, social media has become the most popular choice. The reason social media provides has overtaken these other mediums is due to the speed and the scale to which users can access and share information.

Social media is one of the fastest methods of communication that can reach thousands of people at once. The instant feedback and the ability to share posts with a click enable rapid information dissemination among the online community. This characteristic accommodates the needs of the public during emergency situations because people can be constantly updated as new information emerges. For example, when the earthquakes in Haiti and Japan occurred, many people were able to follow live feeds through many different social networking sites. Social media is also beneficial to law enforcement because it provides an open, convenient platform to collect data from various sources in a short period of time (Gao et al). With this expedited integrated information gathering, police are able to speed up their investigation. In their research, Leysia Palen and Sarah Vieweg, professors at University of Colorado, stated that rapid online social convergence provides larger audiences to assist during emergency events

and provides rapid social ordering (Palen and Vieweg). Therefore, the fast speed facilitated by social media enables rapid information sharing and assists the police with investigation.

Wide-scale interaction is another reason why social media is beneficial for crowdsourcing investigations. Wide-scale interaction describes the potential for broad, immediate, and varied participation provided by the online community (Palen and Vieweg). Because so many people, regardless of age, are online, social media can reach thousands of people in a wide-ranging spectrum. Also, people from across the world can communicate within seconds of a crisis occurring. This allows more people to be knowledgeable and to show support. On the other hand, other forms of media such as TV and radio, takes longer to disperse information, and do not have the ability for people to communicate in a bidirectional manner. Hence, the characteristic of wide-scale interaction and distribution not only informs a large group of people but enables the public to converge and crowdsource. Furthermore, the scope of social media continues to grow. The power and the ability of social networking sites are advancing each year. Soon, it will change the way things are done as it did for communicating with others. Therefore, due to the wide scope and the potential of development, social media will be beneficial to use in crowdsourcing investigations. Moreover, the “ability to ask for help from larger and larger crowds” influences the use of social media. The combination of speed and scale enhances social media, making it a strong medium for the public to use in times of crisis to crowdsource information.

How social media is used

Social media plays a big role in crowdsourcing because it allows the public to become citizen journalists. According to Hagar, social media “enhances citizen engagement and allows citizens to become content generators and disseminators” to spread messages (Hagar). The public is able to post and share their own contents such as pictures or videos or even repost other people’s posts to share updated news.

Furthermore, social media has become a tool for the law enforcement entities to engage the public in aggregating information and to enhance information (Department of Homeland Security). Recently,

the law enforcement and emergency management system have been using social media as a way of communicating with the public and obtaining information about the situation. It is effective for the police to use information gathered by the bystanders because they were the witnesses of what happened at the scene. In the research by Tapia and Moore, they stated that “data directly contributed by citizens and data scraped from disaster bystanders have strongly positive potential to give responders more accurate and timely information than is possible with traditional information gathering methods” (Tapia and Moore). Hence, the information bystanders post on the social networking sites can aid law enforcement in investigating.

Crisis influence on the use of social media

According to a study by Fraustino, Liu and Jin, the public is more active online during crisis situations, increasingly turning to social media for the most up-to-date information (Fraustino et al). With a fast and constant update, social media is used to establish situational awareness during a crisis. Additionally, the Boca Raton Police Department (BRPD) in Florida encourages the use of social media during emergency situations. The department believes that using social media allows them to communicate and inform residents to follow what happens in the city (Alexander). With the use of social media, the BRPD has been able to effectively increase awareness and establish positive relationships with the community. Moreover, there has been research that proves that the public uses social media for emotional release and support, to find and distribute breaking news, and to view and share shocking disaster visuals (Fraustino et al). Through these evidences from the scene, people are able to inform others of what is going on as well as aid police in investigation. For example, Google launched a “Person Finder” during the crisis for people to let friends and family know that they are online. Approximately 5,400 people entered their personal information into the database (Frey). These features of online applications helps the Police by the crowd self-reporting which allows them to focus on the investigations.

How social media was used in Boston Marathon Bombing

The Boston Marathon Bombing is a recent example that shows how the police and the media fundamentally do not understand how social media information is spread and disseminated. Seconds after the bombs detonated, the news about the event surfaced on social media. Within hours of the initial event, the FBI called for bystanders to share images and video of the event (Tapia et al). This guided investigators to start searches on who and what they were looking for. Across the web, people were actively sharing information that also led to their own investigations.

The public was very active on gathering and sharing information through social media sites such as Reddit, Twitter and Facebook. On Reddit, there was a Reddit thread called “FindBostonBombers” that focused on tracking down the suspected terrorists (Potts and Harrison). The editors of this subreddit stated that their “goal was to support the FBI” and they did it by “aggressively trying to locate the terrorists” through the evidence that freely surfaced online (Potts and Harrison). However, the actions of these subredditors and other social media participants led to many false accusations of the suspects and misinformation. For example, when the FBI released images of dark, exploded backpacks, Redditors collected and analyzed suspicious individuals who were wearing backpacks at the scene. (Starbird et al). This effort by the online community led to the false accusation of Sunil Tripathi, which we can see as one of the downsides of crowdsourcing participation.

Twitter was an important medium for communication between the Boston Police Department and the public by providing quick updates of accurate information. Before the bombing, BPD had about 54,000 followers, which grew to more than 330,000 followers during the investigation (Swann). This social media network allowed the followers to have real time information from an accurate source. Also, through the use of hashtags, the BPD not only informed the public about what was going on, but they also issued warnings, such as #communityalert, which informed the public about warnings (Swann). Twitter was a medium used to spread real time information to the widespread world. If Reddit and other social media are open platforms that encourage content creation and discussion, Twitter encourages people to

generate and disseminate information. The retweets permit this by allowing tweets to be reposted, which will then share the post with your networks. According to a study of the tweets from the Boston Marathon Bombing, out of top 50 retweets, 49 retweets were informational, which means that Twitter users considered it most important to spread information about the event, rather than emotional reactions (Giordano). As proven by this event, Twitter provides a fast content dissemination to large group of people.

However, rumors were started through Twitter as the national media picked up conversations online. For example, a photo of a young girl running a race was posted online, with the accompanying claim that she had died in the attack. Though a false claim, the tweet was picked up by @NBCNews and they announced that an eight year old spectator had been killed in the bombings (Starbird et al). Starbird's research shows that although there were tweets of corrections of the information, it lagged behind the rumor, which led to the national media reporting it as the truth. Although the use of social media is useful in generating and sharing information, much false information arose and created controversy.

Overall, good or bad, social media played a huge role in the crisis of the Boston Marathon Bombing. This shows how the larger and larger masses were informed, and, in turn, influenced the investigation through social media. It also shows the capacity to which social media was involved in the process of the official investigation. The previous studies looking at the Boston Marathon Bombing case redefine and establish the role of social media in crowdsourcing investigations.

Chapter 6

Qualitative Method

My goal for the analysis is to prove that there needs to be a better understanding by the police and the media of the social feedback mechanism. I am will be conducting a data analysis to examine the roles of key participants and observe what happens during crowdsourcing investigations through social media.

For the purpose of my paper, I believe that qualitative analysis is the best method to test my theory. Qualitative analysis is an “approach that seeks to understand phenomena in context- specific settings, such as ‘real world setting [where] the researcher does not attempt to manipulate the phenomenon of interest” (Golafshani). This method enables me to look for patterns that occur in my data and provide a possible explanation for why they are happening. Unlike quantitative research that shows causal determination, qualitative research provides “illumination, understanding, and extrapolation to similar situations” (Golafshani). I chose to do a qualitative research analysis because I wanted to provide an explanation as to why I believe certain situations associated with the bombing happened, instead of predicting what I believe will happen. Since I will not be manipulating any variables, what I find from my data will present a true reflection of the situation.

In order to evaluate the quality of the analysis, it is important to focus on the reliability and the validity of the data. Reliability is “the extent to which results are consistent over time and an accurate representation of the total population under study is referred to as” and can be measured by the consistency of results (Golafshani). If my findings convey similar results as previous studies, then it will prove the reliability of the research. Validity determines “whether the research truly measures that which it was intended to measure or how truthful the research results are” (Golafshani). It can be measured by looking at how accurate my data represents the question that I am trying to answer. These two guidelines will aid me in presenting a well done qualitative analysis to prove my theory.

In my thesis, I will be analyzing how a social feedback mechanism works and the challenges that occur during crowdsourcing investigations. By using qualitative research, I will be able to describe the patterns I find pertaining to the roles that the media, the public and the police played during the crowdsourcing investigation of the Boston Marathon bombing. I will be using a Twitter data set that is compiled of tweets that were sent during the crisis to examine what happened first, second and third, as well as which key player acted in what situation. By analyzing the tweets, I will be able to study the patterns of a social feedback mechanism, determine the flaws, and give an explanation of why certain situations might be happening. The data analysis will provide a big picture of the situation, which will portray what is happening from the beginning to the end. Qualitative analysis will contribute to and enhance previous research done concerning the Boston Marathon Bombing and the use of social media. Furthermore, through my qualitative research, I hope to provide a 'real' perspective of my theory. My findings will highlight the importance and provide recommendations for future research.

Chapter 7

Data

In order to test my hypothesis, I will be looking at a compilation Twitter data set that I have received from Nick LaLone, who has previously done a research on Boston Marathon Bombing. I chose to look at Twitter because it was used as a policing tool by the Boston police to keep the public informed, and the most accurate information about the bombing was coming from the official BPD account. During the Boston Marathon bombing, while people used other social network sites to publish and comment on the subject, they used Twitter to spread information. As I mentioned above, followers of the official BPD account increased from 54,000 to 330,000 during the time of the Boston Marathon Bombing which shows that many people turned to BPD's Twitter account for information (Swann). Therefore, I believe that using this social networking site will be the best indication of whether or not there needs to be a better understanding of a social feedback mechanism by the police and the national media.

Specifically, I looked at keywords containing "Sunil", "police", "FBI", "confirm", "news", or "false". I used these keywords to narrow the data to study the tweets from the day of the Boston Marathon bombing. Then, I analyzed my data according to the time and the date of the tweets. The time and the date of when the keywords were first mentioned will determine and explain the roles of the media, the police and the public during the crisis.

The Twitter data set is consisted of tweets from 2013-04-15 02:40:18 to 2013-04-25 17:38:36 (EDT) in time order (Tapia, LaLone and Kim). For my data analysis, I focused on the accusations of Sunil Tripathi because it was one of the biggest and the biggest areas of misinformation crowdsourced event during the Boston Marathon bombing. Through the tweets, I wanted to find out when his name was first mentioned, when the police and/or the news media falsely accused him, and when the police and the national media confirmed the false accusation. Through my data, I hope to support my hypothesis that

there needs to be a better understanding by the police and the national media of a social feedback mechanism.

Because I was only looking at the Sunil Tripathi case, I narrowed the data by only keeping the tweets that contained “Sunil”. I used the IF function to search “Sunil” and formed it so that if it contained the name, it would return with the time it was posted. Specifically, the function I used was:

$$=IF(SEARCH("sunil*",D1,1)>0,C1,"no match")$$

I sorted the tweets so that the mentions of the keyword came first, and that they were in order according to the date and time. When I applied the function, the tweets that did not contain the keyword came up as #VALUE!. I filtered the data and deleted other tweets that did not contain the word “Sunil” so that I could focus only on the relevant tweets. Through this step, I was able to find the first tweet that mentions Sunil Tripathi’s name.

Then, I decided to do multiple analysis and create separate data for when the tweets contained “Sunil” and other important keywords. The results from these will determine the factors I listed above on what I was looking for. I made a sheet with keywords containing “Sunil” and “police”, “Sunil” and “news”, and “Sunil” and “FBI”. These will determine when the police, the media or the FBI mentions Sunil’s name to accuse him and to confirm the false identification. I also made a sheet with keywords containing “Sunil” and “confirm”. Through this data, I hoped to find when the police and the media tweeted about confirming the accusations. Moreover, I filtered the data to have “Sunil” and “false”, which shows when people started talking about Sunil Tripathi being a false suspect.

By narrowing down the data, I will find when and how each player supported the investigation. I will be able to see the roles of the three main participants in how they used Twitter following the Boston Marathon Bombing.

Chapter 8

Findings & Analysis

I observed the trend of the tweets and how the public crowdsourced the data through the evident from the tweets. From the data I analyzed, the first tweet that mentions Sunil Tripathi occurred on April 18, 2013 at 11:38 p.m. when @n8brophy wrote “Sunil Tripathi - Some might think he looks like the kid in Boston. But the FBI photos are too grainy to say for sure. <http://t.co/9y5CivjICX>.” As you can see in Figure 3, the first two tweets that mentions Sunil Tripathi shows the beginning of the misidentification.

Figure 3 First Tweets of Sunil Tripathi

n8brophy	4/18/2013 23:38	Sunil Tripathi - Some might think he looks like the kid in Boston. But the FBI photos are too grainy to say for sure. http://t.co/9y5CivjICX
Chunnnnnnn	4/18/2013 23:49	Sunil Tripathi. One of the Boston bombers. Im calling it.

Immediately after, many people conversed on Twitter, retweeting and posting their own ideas of Sunil Tripathi possibly being the suspect. For example, @derkypope said that “This Sunil Tripathi talk is starting to suck me in,” which shows that he believes that Sunil Tripathi might be the suspect. Tweets in Figure 4 shows different people’s thoughts about Sunil Tripathi, some accusing him of being the suspect and some still figuring out whether he is the suspect or not.

Figure 4 Retweets

rnfjohnston	4/19/2013 0:28	Eerie March 28 article on possible Boston suspect Sunil Tripathi - he might be planning a highly-publicized suicide http://t.co/5Kxkpxniom
goodplanb	4/19/2013 0:30	RT @rnfjohnston: Eerie March 28 article on possible Boston suspect Sunil Tripathi - he might be planning a highly-publicized suicide http://t.co/5Kxkpxniom
EricUhm	4/19/2013 0:33	RT @rnfjohnston: Eerie March 28 article on possible Boston suspect Sunil Tripathi - he might be planning a highly-publicized suicide http://t.co/5Kxkpxniom
derkypope	4/19/2013 0:33	This Sunil Tripathi talk is starting to suck me in. #Boston
willows17	4/19/2013 0:41	sunil tripathi will be trending within the next half an hour #boston
pantsoffhockey	4/19/2013 0:42	RT @willows17: sunil tripathi will be trending within the next half an hour #boston
ebs231	4/19/2013 0:45	RT @willows17: sunil tripathi will be trending within the next half an hour #boston
Silicon5	4/19/2013 0:46	RT @willows17: sunil tripathi will be trending within the next half an hour #boston
DRE_FISHER	4/19/2013 0:49	Remember this name: Sunil Tripathi This is the dude in the backwards white Taylormade R7 hat that is wanted for the Boston Marathon bombing
Carver58	4/19/2013 0:54	#FBI releases images suspect #BostonMarathon bombings is that Sunil Tripathi missing Brown Student? http://t.co/QiszUFq0pV via @BostonDotCom
RaphaelStewart	4/19/2013 1:02	So this Sunil Tripathi kid disappears on March 16 leaving ID CC etc. behind bombings in Boston on April 15 and he favors suspect #2. :(

At 1:07 a.m. people started retweeting @RickLeventhal who wrote that Reddit users found a resemblance between the missing Brown University student and the picture of the suspect released by the FBI as shown in Figure 5. This brought attention to Reddit and people on social media began to use the

information they found on Reddit to do their own research. Some people stated they were sure that it was Sunil Tripathi, while some people were skeptical.

Figure 5 Reddit

Bkline112484	4/19/2013 1:07	@RickLeventhal suspect leaving 2nd bomb far left...reddit users see resemblance to msng Brown U student Sunil Tripathi http://t.co/qGBvbSDTfr
shackett	4/19/2013 1:33	FB Page for Potential Boston Bombing Suspect No.2 Sunil Tripathi -missing Brown student @reddit (V for Vendetta) https://t.co/6CgT7mF9Rj
ChristianChance	4/19/2013 1:43	Reddit is on to something... Boston Bomber #2 sure looks like missing student Sunil Tripathi. http://t.co/GyCluofsW4 http://t.co/koZ2qL8Od9
ClayMNU	4/19/2013 1:45	RT @ChristianChance: Reddit is on to something... Boston Bomber #2 sure looks like missing student Sunil Tripathi. http://t.co/GyCluofsW4 http://t.co/koZ2qL8Od9
Tweetraiser	4/19/2013 1:45	RT @shackett: FB Page for Potential Boston Bombing Suspect No.2 Sunil Tripathi -missing Brown student @reddit (V for Vendetta) https://t.co/6CgT7mF9Rj

Many people also tweeted this information to @Boston_Police, @MassStatePolice, and @FBIBoston, which show a sign of crowdsourcing from the public. Then people began to share Sunil Tripathi's Facebook page and accused Sunil Tripathi of being the suspect number 2, as we can also see from Figure 4.

At 6:39 a.m. The Boston Globe accused Sunil as the second suspect according to the first tweet that mentions Boston Globe by @prisco. As you can see from Figure 6, this is also retweeted many times by different users. Immediately after @prisco tweets the information, @TheinSneider retweeted it along with several other people.

Figure 6 The Boston Globe

prisco	4/19/2013 6:39	Boston Globe claiming one suspect in custody. Guy in white backwards hat. I think that might be Sunil Tripathi missing Brown student.
TheinSneider	4/19/2013 6:40	RT @prisco: Boston Globe claiming one suspect in custody. Guy in white backwards hat. I think that might be Sunil Tripathi missing Brown student.
srkfitzgerald	4/19/2013 6:40	RT @prisco: Boston Globe claiming one suspect in custody. Guy in white backwards hat. I think that might be Sunil Tripathi missing Brown student.
CasCousins13	4/19/2013 6:40	I know who suspect #2 is from the Boston Marathon Bombings... Sunil Tripathi
charlestrotter	4/19/2013 6:41	RT @prisco: Boston Globe claiming one suspect in custody. Guy in white backwards hat. I think that might be Sunil Tripathi missing Brown student.
DomSalvaggio	4/19/2013 6:41	RT @prisco: Boston Globe claiming one suspect in custody. Guy in white backwards hat. I think that might be Sunil Tripathi missing Brown student.

Figure 7 The Boston Police

TunaCharlie	4/19/2013 6:52	BPD scanner has identified the names : Suspect 1: Mike Mulugeta Suspect 2: Sunil Tripathi. #Boston #MIT
prisco	4/19/2013 6:52	Boston PD scanner says it was suspect in white hat. Total internet speculation but thats the one people are saying is Sunil Tripathi.
SeanTuohey	4/19/2013 6:52	Boston Police identify suspect as missing Brown student Sunil Tripathi. Family (presumably) removed Facebook page shortly after MIT shooting
mattholly	4/19/2013 6:52	Boston Police Name Suspects: Suspect 1: Mike Mulugeta Suspect 2: Sunil Tripathi
aussietorres	4/19/2013 6:52	RT @KallMeKG: BPD scanner has identified the names : Suspect 1: Mike Mulugeta Suspect 2: Sunil Tripathi. #Boston #MIT
dbrownlee15	4/19/2013 6:53	RT @mattholly: Boston Police Name Suspects: Suspect 1: Mike Mulugeta Suspect 2: Sunil Tripathi
biggalaxy	4/19/2013 6:53	RT @aussietorres: RT @KallMeKG: BPD scanner has identified the names : Suspect 1: Mike Mulugeta Suspect 2: Sunil Tripathi. #Boston #MIT
JOSHinHD	4/19/2013 6:53	Suspect #2 is missing Brown student Sunil Tripathi #mits shooting #boston #bostonbombing
suzannejdean	4/19/2013 6:53	RT @SeanTuohey: Boston Police identify suspect as missing Brown student Sunil Tripathi. Family (presumably) removed Facebook page shortly after MIT shooting
drdrjojo	4/19/2013 6:54	RT @aussietorres: RT @KallMeKG: BPD scanner has identified the names : Suspect 1: Mike Mulugeta Suspect 2: Sunil Tripathi. #Boston #MIT
scomeaution	4/19/2013 6:54	RT @SeanTuohey: Boston Police identify suspect as missing Brown student Sunil Tripathi. Family (presumably) removed Facebook page shortly after MIT shooting
SG_Mizzou15	4/19/2013 6:54	Boston Police Department released the names of the suspects: Mike Mulugeta and Sunil Tripathi. Tripathi was the missing student from Brown.
mistermitchem	4/19/2013 6:54	RT @SeanTuohey: Boston Police identify suspect as missing Brown student Sunil Tripathi. Family (presumably) removed Facebook page shortly after MIT shooting
jalomar15	4/19/2013 6:54	RT @TunaCharlie: BPD scanner has identified the names : Suspect 1: Mike Mulugeta Suspect 2: Sunil Tripathi. #Boston #MIT
seanieviola	4/19/2013 6:54	Boston Marathon Bombers names are supposedly Mike Mulugeta and Sunil Tripathi.

Around 6:50 a.m. there were tweets that read Boston Police identified suspect as missing Brown student. Figure 7 shows that within minutes, there were many people retweeting the information and confirming Sunil Tripathi as the 2nd suspect. Today, we know that this is a false accusation. One reason

that Sunil Tripathi was falsely accused was because of the conversations on social media. People began to comment when Reddit accused Sunil Tripathi of being a suspect and this accusation spread within minutes. Then, we see the news media picking up on this story and publishing an article, confirming Sunil Tripathi as a suspect. This shows how the media attains information from social media and turn it into a story even before it was confirmed. After the media confirmed it, those who had doubts was confirmed that Sunil was one of the suspects. From my data, I found that as people started talking about Sunil Tripathi, the media confirms it, and then the police comes in to confirm it. After, people start talking on media again, and the national media picks it up, and then comes in the police.

Moreover, at 9:15 a.m. people began to talk about the false identification of Sunil Tripathi as @sameerasen tweeted “Authorities now say the Boston bombing suspect is military-trained not US-born. Probably not Sunil Tripathi. Nightmare for his family!” and @wordbubbles tweets “IF SUNIL TRIPATHI IS NOT SUSPECT 2 ONE LEGACY OF THIS NIGHT WILL BE THE IRRESPONSIBLE NATURE OF ONLINE REPORTING. #Boston #Watertown.”

Even before the police confirmed it, the news releases an article based on what the social media is saying. At 9:17 a.m. @dianaWatt tweeted “They are finally saying that the person they are looking for is NOT Sunil Tripathi on MSNBC #watertown #boston.” Figure 8 shows how people were skeptical about Sunil Tripathi being a suspect and then, NBC confirmed that Sunil is innocent.

Figure 8 False Accusation

sameerasen	4/19/2013 9:15	Authorities now say the Boston bombing suspect is military-trained not US-born. Probably not Sunil Tripathi. Nightmare for his family!
karmicvoyage	4/19/2013 9:16	RT @sameerasen: Authorities now say the Boston bombing suspect is military-trained not US-born. Probably not Sunil Tripathi. Nightmare for his family!
WordBubbles	4/19/2013 9:16	IF SUNIL TRIPATHI IS NOT SUSPECT 2 ONE LEGACY OF THIS NIGHT WILL BE THE IRRESPONSIBLE NATURE OF ONLINE REPORTING. #Boston #Watertown
aft1262	4/19/2013 9:16	RT @DrAQ_Khan: The alleged suspect for Boston bombings was a Hindu Sunil Tripathi. We urge Western media to now showcase all Hindus as Terrorists
DianaWatt	4/19/2013 9:17	They are finally saying that the person they are looking for is NOT Sunil Tripathi on MSNBC #watertown #boston
ashtonelijah	4/19/2013 9:17	NBC says that Sunil Tripathi is NOT one of the suspects. Again Sunil Tripathi is NOT one of the suspects in the #Boston bombing.
azadehg	4/19/2013 9:17	@msnbc reporting that suspect #2 is NOT Sunil Tripathi #bostonmarathon #boston #p2 #p2by #watertown
TJnPJs	4/19/2013 9:17	RT @DianaWatt: They are finally saying that the person they are looking for is NOT Sunil Tripathi on MSNBC #watertown #boston

After analyzing the tweets, I found a pattern on how people conversed on Twitter. First, someone will say something about a subject and then other people retweet the conversation which spreads to many different networks. This makes people aware of a certain idea which they begin to search for themselves. For example, when the idea of Sunil Tripathi came up, people retweeted this name which many people

became aware of. Then, people started doing their own investigations using the information they found or what others had said. Also, they tweet the information to the major news sources and the police to inform them of their findings. As this happens, a few hours later, more and more people begin to find out, which brings more attention to the subject. The national media, who is very attentive to the tweets and the conversations on social media, then confirms the idea by just looking at what people say, as opposed to using hard evidence. A large amount of confirmations then led the law enforcement officials to falsely accuse suspects. When the law enforcement or national news media confirms an accusation, it gives more certainty to the public so the news begins to spread even faster. However, conversations on social media do not end there. Citizens go on and on about their findings and they do more investigations, which leads to different conclusions and more discoveries. This is where the example of the false accusation of Sunil Tripathi come up. As people look at more evidence, they realize that Sunil Tripathi is not the right guy. People on social media continue to communicate with one another about their findings, and again, the national media brings it to the attention of the rest of the nation. This proves that the media releases news about what they believe to be true, based on how many conversations they find online. They jump to the conclusion to instantly report the breaking news. However, this is unreliable because the national media only takes into consideration what the citizens have crowdsourced and not the confirmations from law enforcement.

Moreover, an example of the national media falling victim to social media is when New York Post released the picture of the two guys from 4chan on the front cover. They had no connections to the bombing but they were suspected due to racial profiling (Frey). This false accusation resulted from conversations on social media presents how national media is convinced by what is discussed online. Even without hard evidence, the New York Post were willing to release the pictures and accuse two innocent men on their cover page. Their post of the “bag men” was obtained from social media that people posted when they were trying to look for possible suspects wearing backpacks. Using this as evidence to accuse two men shows how unprofessional New York Post was and also shows how much

national media trusts social media for information. Therefore, I believe it is dangerous for national media to depend on online postings because as trusted news sources, they should be more careful on what they report to the mass public.

As I look at my findings, I believe that a social feedback mechanism is happening but the media and the police do not understand the process well, which leads them to make mistakes. Police officials do not seem to understand that people are not going to just submit information and stop there. People are going to self-police and try to investigate on their own. As people find new information, they share it on social media which is spread to thousands of people. On the other side, the national media is paying close attention to what is happening online and as people start confirming what they believe to be true, the media releases the blast, even though it might be wrong. In this situation, the media does not understand that people are just conversing with one another, and that what they say does not always contain the truth. Since the media is always scoping for new information, whatever they find to be true will be released to the public, at times, it seems, regardless of consequence.

Chapter 9

Conclusion

A news story begins the moment a crisis occurs. Now, the police have to figure out what happened, who did it, how it happened, when and where it happened, and what the result was. The only evidence they have is the scene of the crime. Police has to figure out the answers to these questions immediately in order for the public to be aware of what happened, but it is difficult for them to figure out everything in such little time. Therefore, they ask the bystanders and the rest of the public who is aware of the situation for help. They ask for pictures, videos, or any information that they can provide with in order to help investigate. This is how crowdsourcing begins.

Police use many different types of medium to ask the public to crowdsource and provide them with any information. They use TV, radio and social media to spread their message to thousands of people. Recently, social media has been one of the largest mediums for communication. Due to the advancement of technology, people are able to access social media through their handheld devices, which make it convenient for people to share instantly. After the public receives the message, the crowd shares pictures, messages and videos regarding the crisis that will aid law enforcement with the investigation. In a perfect world rich with information, this system would flow constantly and accurately. However, with every shortcut come unforeseen side effects.

As people use social media to share evidence, people start doing their own investigations off of the information they found online. This might cause problems because the information people post online could lead to false accusations and spread before anybody is able to correct it. As I mentioned before, posting on social media can spread to thousands of people within seconds. Years ago, rumors circulated by word-of-mouth, and as a result, were slow to spread, but with the increased use of social media, rumors spread at a greater pace (Hagar). In a short matter of time, many people are going to believe

wrong information. Furthermore, the media creates credibility in the false information by posting articles based on what people have been sharing on social media. In the end, this creates a messy situation that ends in the police having to clarify the misinformation, rather than being provided with accurate information, as crowdsourcing originally intends.

These types of situations are caused by two possible reasons: (1) the police and the media not understanding how social media functions, and (2) them not being able to control social media. When the police asked the public to crowdsource, they wanted the information given to the police. However, as people share online, police cannot control the public from not sharing amongst themselves and making false assumptions. Additionally, the national media does not understand how social media works. Social media is used by people online to converse among one another, and those people who use it are not expert investigators. Hence, things that people say online are not meant to be taken as completely true or false. However, when the media sees information online, they see it as a potential article they could write about. Once the media publicize an article, more people find out about the misinformation, decreasing the credibility of the national news source. Therefore, we see that although crowdsourcing can be beneficial to the investigators, national media and police have to understand the idea of social media and how people use these platforms.

What does this mean?

The Boston Marathon Bombing is not the only event that the public happened to use social media to crowdsource. It is the event that emphasized and brought to attention the value of using social media. With one medium, it informed the public as well as provided a platform where one can generate and share contents, and participate in investigations. Due to the scope and the speed it provides, social media is a valuable medium for the police and the national media to use during crisis.

Through my study, I realized that it is very important to have an understanding of the social feedback mechanism. Although it is not a complicated system, it is very hard to control because so many

people are involved. Findings from my study show that it does not take long for a message to spread.

Therefore, it is important for anybody online to be careful and be responsible for what they say and share.

Additionally, the national media and the police should be cautious when using social media. If they do not have a clear understanding of the social feedback mechanism, like they failed to have in the Boston Marathon Bombing case, they are going to lose control of the public and make false reports. The police need to realize that when they ask the public to crowdsource evidence, the public is going to share it online and people are going to do their own investigations. Because the online community and social media are so developed, users are capable of obtaining information and doing their own research. They also communicate with one another in an open platform to share their findings and opinions. This is the way the crowd feeds information, and checks the validity of evidence. This process repeats over and over again, and this is how people converse online. However, as we saw in the findings, the national media does not understand the social feedback mechanism, which led to false reporting. Once there is a general consensus on social media on a certain subject, the media sees it as a confirmation that it is true, which leads them to report when it might not be true. This is how misinformation gets out and rumors start. Therefore, I believe it is very important for the national media to understand the social feedback mechanism and the police to control the online public in order to prevent any future problems.

In the future, I believe that social media will be the most effective in assisting during disaster events such as hurricane and earthquake crises. Especially since these events do not require as much deductive reasoning as crime events, social media can be used without having to worry about the online community making false accusations or reports. On the other hand, I believe it is very important to carefully assess the use of social media during crime investigations. Bystanders will definitely be a huge support to the investigation as they share pictures, videos and information but the police have to be cautious about what is happening on social media so that false accusations and reports are not reported like they were in Boston Marathon Bombing. As we can see, the involvement of the online community through social media is becoming prominent, but the key participants should have a clear understanding

of the social feedback mechanism in order for everyone to benefit from the use of the social media as a crowdsourcing investigation tool.

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ACADEMIC VITA

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EDUCATION

The Pennsylvania State University, Schreyer Honors College

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Bachelor of Arts in Political Science

May 2015

- Minors: Business & Sociology

WORK EXPERIENCE

Infinity Technology, LLC

McLean, VA

Business Development Intern

June 2014 – August 2014

- Worked in tandem with corporate executives to plan and coordinate business generating activities, such as responding to clients' request for proposal (RFP) and request for information (RFI).
- Presented a PowerPoint presentation to the company's Board of Directors describing NOAA's financial budgets and upcoming business opportunities in the forecast and pre-solicitation phases.
- Participated in the screening of potential business deals by analyzing market strategies, deal requirements, and financials.

CASTY, Inc

Remote Location

Research Analyst Intern

May 2014 – August 2014

- Served as the sole intern for a startup company focused primarily on mobile application development. Worked exclusively on a project called *Storizm*, a photo sharing, story-based magazine application (Apple, Android, Web).
- Enhanced the company's marketability to investors by creating a business plan, executive summary, and PowerPoint presentation highlighting key competitive advantages and *Storizm's* business model.
- Researched and analyzed competitor content curation services based on User Interface (UI) and User Experience (UX).
- Developed and launched brand marketing campaign across multiple platforms such as iTunes App Store, Google Play, and LinkedIn.

Seung Zhi Law Firm

Seoul, South Korea

Law Clerk Intern

May 2013 – August 2013

- Effectively worked as an intern in a cross-functional role with full responsibility of supporting senior attorneys.
- Utilized a variety of research techniques and sources towards distinguishing differences between Korean and American legal systems on trial proceedings and handling of court cases.
- Conducted detailed analysis on over 50 corporate and family law court cases.

LEADERSHIP

Korean Student Association

University Park, PA

President / Treasurer

August 2012 – Present

- Led a team of nine officers and doubled membership totals from the previous year.
- Spearheaded cost-benefit analysis and budgeting of all club events and fundraisers.
- Budgeted and obtained funding for major programs such as Disney guest speaker event: *The Technology Behind Animated Films*.
- Collaborated with the Korean Department in planning, managing and budgeting for annual culture show.
- Promoted strong teamwork and development through open communication, encouragement, and team-building activities.

Penn State IFC/Panhellenic Dance Marathon (THON)

University Park, PA

Finance Committee Member / Operations Committee Member

September 2012 – February 2014

- Reviewed and entered checks in excess of \$5,000 every week.
- Participated in numerous events to support fundraising and outreach for THON.
- Collaborated with other members for preparations, operations, and teardown of THON weekend to ensure the safety of children, dancers and all participants.