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A network analysis of official Twitter accounts during the West Virginia water crisis

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ABSTRACT

Online networks using Web 2.0 technologies have proven useful for communication among all parties involved in managing crises. These networks rapidly disseminate information allowing for coordination among organizations responding to the needs of those whose safety and wellbeing are threatened by the crisis and its aftermath. This study provides a network analysis of official Twitter accounts activated during the Charleston, West Virginia, water contamination crisis in 2014. The city's water supply was rendered unfit for drinking or bathing after 7500 gallons of a toxic chemical leaked into the Elk River. The network created by the 41 Twitter accounts associated with the West Virginia water contamination lacked density, contained several isolates, exchanged information quickly (geodesic distance diameter), and contained both national and local accounts. The lack of density indicates limited exchange of information, particularly between national and federal accounts. The rapid dissemination of the information that was shared and the fact that some accounts did bridge the local and national gap, however, show the positive potential for such networks in responding to crises.

1. Introduction

The state of West Virginia is no stranger to environmental disasters. In early 2014 the state earned the unfortunate distinction of being the home of the largest drinking water contamination in US history. The water contamination occurred on January 9th, and although the ban on drinking and bathing in the water was lifted on January 18th, affected residents continued to refrain from using and consuming the water because the odd smell and funny taste that first alerted people to the contamination remained. Throughout the duration of this crisis, affected residents have sought information and messages of self-protection from trusted authorities. These messages are usually distributed via traditional and new media sites. Thus these sources are where people do the majority of their information seeking. According to Sellnow and Seeger (2013) "the application of new social media or Web 2.0 technologies such as Twitter, Facebook, Flickr and Google Maps increases the speed and richness of information shared across and within the groups" (p. 130). Additionally, online networks are useful for "orchestrating the communication between all parties involved in handling the crisis, by allocating and managing resources, and by providing access to relevant crisis-related information" (Kienzle, Guelfi, & Mustafiz, 2010, p. 1). However, this information sharing is only complete insofar as the network formed by these organizations is complete and all the appropriate ties exist between the nodes that comprise the network. Without a well-established network where all nodes are connected to each other, the flow of communication and important messages will be stifled. Such lack of connection is counter to the process of disseminating pertinent disaster related information and messages of self-protection, which is the primary purpose of crisis communication.

There have been many studies done on social media from the audience perspective on why/how they use social media in a crisis, how they judge credibility of sources and information, etc., but fewer studies have been done from the perspective of the organization and fewer still on how organizations are embracing Web 2.0/new media and incorporating it into their crisis planning and response. Twitter is one of the "new media" channels that people use to gather and disseminate information. Thus, the data set used in this analysis is comprised of information from 41 official Twitter accounts (see Appendix A) from people and organizations directly related to the 2014 West Virginia water contamination (e.g. the governor of West Virginia, West Virginia American Water Company, The Centers for Disease Control). Therefore, the purpose of this study is to examine the structure of the network formed by

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these Twitter accounts. Because they each play a different role in the disaster response and are considered expert/reliable sources by the affected audience/population, logic follows that these organizations understand the importance of efficiently sharing information with each other and to quickly provide essential information to the publics that "follow" them in the figurative/social media sense. The remainder of this paper provides a summary of the case, a review of the literature surrounding best practices for risk and crisis communication and social network analysis, followed by a description of the data set, analysis procedures, and a discussion of the results. Finally, a summary of the paper including limitations and future directions is provided.

1.1. Case summary

On January 9, 2014, residents of Charleston, West Virginia and the surrounding counties began noticing an unusual, cloying sweet smell in the air and in their homes, particularly when the water was running. The first formal complaint to this effect was registered with the Department of Environmental Protection at 8:15 a.m., however, the West Virginia Water Company was not made aware of the situation until noon and, at that time, was under the impression that the water treatment facilities' carbon filtration system would be able to handle the problem. However, it soon became apparent that the contamination exceeded the systems capabilities and at 5:09 p.m. the determination was made that the water was unsafe for consumption or use (Ward & Gutman, 2014). Customers were notified of this ban at 5:45 p.m., a full nine and a half hours after the first complaint was registered with the DEP.

Determining the source of the contamination did not take long. Freedom Industries, which has facilities on the banks of the Elk River near the juncture where it connects with the Kanawha River, stores chemicals for use in the mining, cement, and steel industries. Workers at the plant noticed a leak coming from a 1-in. hole in a tank that contained the chemical 4-methylcyclohexylmethanol (MCHM). Approximately 7500 gallons had already leaked into the Elk River and were making their way through the various streams and other waterways that fed off of it.

When news of the contamination broke, affected residents, estimated to be around 300,000 individuals, were instructed not to drink, bathe in, cook with, or wash with the water. The only functional use for the water was flushing toilets. While this information was pertinent for self-protection, it came too late for the 122 residents who had already sought treatment for nausea, vomiting, and/or diarrhea, which are common symptoms of exposure to MCHM. By January 14, nearly 700 people had contacted the poison control hotline reporting symptoms including nausea and rashes, and the total number of individuals hospitalized reached 14 (Heyman & Fitzsimmons, 2014). Fortunately, none were in critical condition, and to date, no fatalities have occurred as a direct result of the contamination.

West Virginia's governor declared a state of emergency shortly after the contamination (and its magnitude) was realized. Schools and businesses closed and hospitals began emergency water conservation practices. Shortly thereafter, President Obama declared a federal state of emergency for the affected area and FEMA was instructed to provide ground assistance as well as funding for the state's emergency management efforts.

Authorities began lifting the ban on January 13, beginning with hospitals and working outward from there. However, shortly after announcing the lifting of the ban, officials quickly amended the statement to exclude pregnant women and children under three years of age, who were still to refrain from using/consuming the water despite the ban being lifted in their area "out of an abundance of caution."

Despite the fact that the ban was lifted and all federal aid in the form of bottled and potable water deliveries had ceased, 8 weeks post contamination, many residents still refused to drink or use the water in their homes. This is because those who attempted to use it continued to experience rashes, nausea, and vomiting, and some still noticed the same licorice smell and odd taste that have been present since the onset of the contamination. Besides the obvious frustrations of having to use bottled water for consumption and for all basic household functions, West Virginians also faced the added challenge of finding the bottled water on their own. Naturally, most grocery stores and supermarkets could not keep shelves stocked with water, further complicating matters.

One year after the contamination, this crisis is still in the news. Residents are still distrustful of the water and hesitant to consume it. Many residents with the financial resources are still using bottled water for drinking, though that is not a viable option for all. Freedom Industries and its top officials are also embroiled in a lawsuit alleging the gross negligence of the company during the crisis and for refusing to take recommended action despite being aware of the weaknesses in the tanks and containment systems at the site.

2. Theory

2.1. Best practices in risk and crisis communication

Research designed to identify and test the effectiveness of best practices for crisis planning, management, and recovery are common in the risk and crisis communication literature, particularly in the contexts of food-borne illness and natural disasters (Seeger, 2006; Steelman & McCaffrey, 2012). This ongoing research objective serves as a "form of grounded theory" intended to provide recommendations for improving "organizational and professional practice" (Seeger, 2006, p. 232). Ideally, identifying the best practices of risk and crisis communication can assist organizations in "closing the gap between desired practice and current practice" (Steelman & McCaffrey, 2012, p. 700). Research to identify the best practices for risk and crisis communication covers the full range of a crisis event, beginning with identifying risk factors, moving through the manifestation of risk into crisis, and ending with recommendations for crisis recovery. Matters such as updating crisis plans and remaining culturally sensitive at all stages are also included (Littlefield, 2013; Sellnow & Vidoloff, 2009). If used effectively, best practices can help spokespersons avoid "common pitfalls" in their crisis planning and communication such as a providing a delayed, inconsistent, or evasive response (Venette, 2006, p. 230).

Best practices research in risk and crisis communication features "information-sharing networks" as "effective and efficient ways of obtaining new insights that can then be incorporated into the planning process" (Seeger, 2006, p. 238). During crises, networks address the need for information exchange involving all parties involved, including the affected publics (Steelman & McCaffrey, 2012). Best practices research encourages organizations to engage in networking activities with related organizations and those with whom they might need to partner in the event of a crisis such as the media, shareholders, and other stakeholder groups. This is where the network formation process comes into play, and as was established earlier, the importance of including social media networking in this process cannot be underestimated or overlooked.

2.2. Network analysis

Networks are frequently studied in response to large, global crises such as HIV–AIDS (Shumate, Fulk, & Monge, 2005). The objective of such research is to monitor alliances that function

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