How America Government Framed Crisis and Interacted with public on Social media

Case Study from 2012 Hurricane Sandy

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Abstract ：Social media is a subject of government interest in emergency response. Government usage of social media in crisis has four functions: information display, information obtain, public expression platform and interaction tool. Though much attention has been given on government usage of social media in crisis, little research is focused on government's interaction with public via social media. This research did a case study on how government agencies of New York City (NYC) use social media to frame crisis and interact with public. By coding crisis framing and counting public re-tweets per tweet, public question, government reply and public positive and negative attitude numbers of five main crisis management agencies in NYC. The findings indicate that public and government had different attentions over crisis; NYC government had a relative high interaction intensity with public and interaction with public may influence public attitude. This research concludes some advice for government using social media in crisis.

Keywords; Crisis; Government; Public participation; Social media; Case study.

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INTRODUCTION:

An estimated damage of $50 billion made Sandy the second costliest tropical cyclone (TC) in U.S. history, surpassed only by Hurricane Katrina (2005)(Shen, DeMaria et al. 2013).Though they both faced long periods of widespread preparation, response and recovery, Sandy happened in a different period when compared to Katrina: the evolution of the mobile phone and other mobile technologies, computers, internet access, and digital video equipment were reshaping the network communication framework and the ways we connected with each other(Veil, Buehner et al. 2011). Therefore, 2012 Hurricane Sandy posed a significant challenge to disaster managers: keeping the public informed and engaged in the new media age during a widespread crisis.

As one of the most affected cities, Hurricane Sandy resulted in 97 deaths In the New York metropolitan area; produced major power outages, some lasting weeks; and created billions of dollars in structural damage(Schmeltz, Gonzalez et al. 2013). The response to Sandy in NYC represented the disaster management of urban city government. So we took government agencies of New York City as an example and evaluated how the government agencies addressed this challenge , as well as how they inform and engage inform the public through examining their social media articles and analyzing replies from the public. The findings provided valuable insights because Hurricane Sandy occurred during a time when social media outlets are beginning to become mainstream vehicles for issuing crisis responses(Kavanaugh, Fox et al. 2012). This disaster is an ideal case to examine how government agencies used social media to handle crisis, because of the timing and necessity of governmental response in hurricane Sandy's case.

As a result, the study findings add to the growing literature on how government frame crisis information via social media with involving the role of public attention. In addition, the findings contribute to the limited literature on understanding public expression and government interaction with public in crisis on social media.

SOCIAL MEDIA USED

BY GOVERNMENT IN CRISIS

Social media are internet-based applications built on Web 2.0 technologies, most basically, the creation and exchange of user generated content (O'Reilly, 2007). Social media takes the form of online bulletin board systems like listservs, forums, newsgroups and more recently, blogs (Tepper, 2003) and microblogs (e.g., Twitter). When private individuals become sources of online information, 'sharing opinions, insights, experiences and perspectives with others' (Marken, 2007, p. 10), consumers of information are simultaneously contributors . This provides the basis for a new kind of media named user-generated media on which everyone can publish information and compete with(?)traditional mass media. In recent years, social media have been incorporated into the governmental workplace and have been seen as effective tools to engage citizens, promote transparency and advance public service (Oliveira and Welch 2013). The need of public goals was the main reason for widely use of social media in government agencies(Mergel 2013). The convenient and efficient ways of sharing information via social media make it important tools for using, developing and diffusing information to public and facilitating public participation in public affairs and interaction with whole society.

Those advantages could be even more obvious in government using social media to response to crisis. In crisis, social media can share and re-share news immediately, reaching millions of people without the intervening presence of journalists; important information like rescuing, first aid, help request, resource, donation, transportation posted by the public can be easily obtained by government to facilitate the response and relief actions; the government social media accounts can also serve as platforms for public to express their opinions about government action which prompts the public engagement in crisis; finally, if the government reply to public opinions and have dialogues with public, they have interaction with public via social media.

Fig 1 shows four functions of social media used by government in crisis: information display, information obtaining, platform for public expression and tools for interaction. It also points out information sharing ways of each function. The information display on social media is information from government to public. Information sharing ways of Information obtaining and platform for public expression functions are both from public to government. The public used social media to report problems and needs, call for help, look for or provide information and support throughout crisis. The information shared by the public both informed and engaged government agencies, providing enhanced situational awareness for response officials. The differences between information obtaining and platform for public expression functions are those information actively requested and/or shared via social media channels in the latter one, but passively collected by government officials scanning the networks for applicable information in the former one. In the last function-tools for interaction, two-way information sharing way assures more interaction between government and the public. The four functions take shape from less interaction to more interaction step by step.
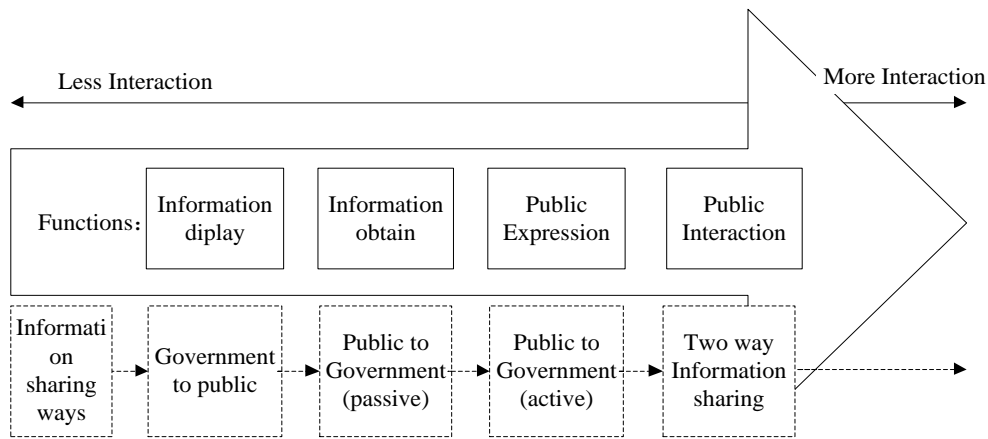
Figure1: Functions of Social Media

used by Government in Crisis

According to the functions, the research wants to figure out:

For information display:

RQ1: How government agencies of NYC framed crisis via their social media responses to Hurricane Sandy?

For public interaction:

RQ2: How often did the public post question and government agencies reply on social media in crisis?

I.   HURRICANE SANDY

We briefly summarize the origin and outcomes of hurricane Sand to provide context for the study.

Table 1: Period of Hurricane Sandy

Time	Period
Before 22nd Oct, 2012	Long term preparation
22nd Oct. 2012-28th	Last minute preparation
29nd Oct. 2012	Disaster happen
Nov. 2012	Early recovery
Dec.2012 to now	Long term Recovery

As table 1 shows, Storm Sandy appeared as a low pressure center in the southwestern Caribbean Sea at 21 October, turned into a tropical depression at 22 October, and started moving northeastward at 23 October. It made an unusual northwestward turn at 29 October and caused land fall at that night near Brigantine, New Jersey, devastating surrounding areas and causing tremendous economic loss and hundreds of fatalities. The hurricane caused tens of billions of dollars in damage in the United States, destroyed thousands of homes, leaving millions without electric service1. And just after the disaster happened, there was quick recovery period to repair the transportation, electricity and other public facilities. The long term recovery of sandy last until now.

New York Citywas severely affected， including the flooding of the New York City Subway system, many suburban communities, and all road tunnels entering Manhattan except the Lincoln Tunnel, and the closure of the New York Stock Exchange for two consecutive days. Numerous homes and businesses were destroyed by fire, including over 100 homes in Breezy Point, Queens. Large parts of the city and surrounding areas lost electricity for several days, and several thousand people in midtown Manhattan were evacuated for six days due to the crane collapse at One57. Bellevue Hospital Center and a few other large hospitals were closed and evacuated. Thousands of homes and an estimated 250,000 vehicles were destroyed during the storm. Economic losses across New York were estimated to be at least $18 billion2. The governments took many actions in sandy response and recovery, but the long-term recovery is still on its way.

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[1]"Sandy leaves millions without power; 16 dead". USA Today. 30 October 2012. Retrieved 2012-11-05.
[2] http://en.wikipedia.org/wiki/Effects_of_Hurricane_Sandy_in_New_York

II. METHOD

A. Sampling procedure

To investigate possible differences in framing the 2012 hurricane sandy crisis among government agencies, this study quantitatively evaluated social media response documents distributed by 5 government agencies. We purposefully selected Office of the Mayor, New York City Government, New York City of Emergency Management (OEM), New York Police Department(NYPD) and the Official Fire Department, City of New York(FDNY) because they are leading government agencies responsible for responding to large-scale crises in NYC.

All social media response documents released since 22ndOct, 2012 to 28th Nov, 2012 were retrieved from the organizations' official Twitter feeds. The paper selected Twitter because it is one of the primary social media outlets governments used to respond to crises at the time the study was conducted (Sutter, 2009) and also the 5 agencies all have its accounts. Data collection started on 22nd Oct, 2012 because this is when Sandy turned out to become hurricane ended data collection on 28th Nov, 2012 because it is the day mayor of NYC announce the damage assessment of Hurricane Sandy which means the long term recovery start and quick recovery is over.

B. Variables measured

To examine framing in the 4 government agencies' hurricane crisis responses, three general frames were operationally defined: (1) information frame, (2) action frame, and (3) opinion frame (table 3) based on previous literature discussed above (e.g., An & Gower, 2008; Choi & Gower, 2006; Liu, 2009; Semetko & Valkenburg, 2000; Shih et al., 2008; Liu and Kim 2011). The details is in talbe 2.

Table 2: Government frame

Frame	Description
Information frame	
Situation Updates	Providing factual information about what was happening in the effected area. Like damage, changing storm condition, weather updates and safety information. Such information improves situational awareness in disaster response.
Public services information	Information like closure/ re-opening of transportation, public school, access routes, scheduled events, power, phone, internet or cable services information.
Orders	Evacuation order and shelter information
Rumor clarification	Clarify unreal information and rumor on social media or from other source about crisis
Action frame	
Leadership	Discusses an organization's major achievement/milestone in response to a crisis
Incident response	Specific incidents or response efforts during the hurricane
Relief Actions	Relief related actions, including preparation, clearing of hurricane debris, donation, mourning activities, logistic and proposing relief actions to the general public
Coordination	Emphasizes coordination among organizations responding to the crisis
Engagement invitation	Invitation to public of engagement in the disaster relief and information collection
Opinion frame	
Reassurance	Messages instructing publics to not worry about the crisis by emphasizing readiness and/or successes of the organizations combating the crisis
Suggestion	Providing suggestions to the public activities like suggest public when to call 911 or 311 and to evacuate.
Uncertainty	Discusses uncertainty in any aspect of the crisis including the cause, the cure, and the possible spread

The public interaction means if the public post question on government social media account during crisis, if the government reply to public. (e.g., Choi & Lin, 2009; Coombs & Holladay, 2005; Jin, 2009).

A. Coding procedure

A coding protocol was developed to capture the variables under investigation with definitions and examples. All indicators for the variables were coded based on the dichotomy of the message's presence (i.e., 1 or 0). For government frame, composite measures for the three frame types and the public expression variable were created by summing up the score of each indicator (either 1 or 0) for data analyses.

III. RESULTS

A. Government Frames

Table 3:Government frames

Government	Information	Action	Opinion
	F=6.995, p<0.01	F=6.228, p<0.01	F=6.228, p>0.05
Mayors'office	0.4(0.491)	0.44(0.497	0.12(0.322)
NYCgov	0.51(0.503)	0.47(00.502)	0.03(0.16)
NYPD	0.27(0.452)	0.73(0.452)	0
FDNY	0.18(0.388)	0.64(0.485)	0.14(0.351)
NYOEM	0.51(0.501)	0.38(0.485)	0.1(0.306)
NotifyNYC	0.43(0.496)	0.44(0.497)	0.1(0.3)

To answer RQ1 (how government framed Hurricane Sandy) we created composite measures for the three frames. As in table 3, first, among the three frame categories, government agencies framed hurricane sandy most frequently using action frame (n=420, 54.4%) and information frame (n=265, 34.3%) than using opinion frame (n=77, 10%). When examining government agencies differences, five agencies act differently in using the information(F=6.995,p<0.01) and action(F=6.228,p<0.01) frame, while government of NYC framed information frames most(M=0.51,SD=0.503) than others and NYPD framed information frames most(M=0.73,SD=0.452). Five agencies had similar performance in opinion frames(F=6.228,p>0.05).

A. Public interaction

Table 4:Public and government interaction

Government	Public quesiton	Government repley
	F=61.537,p<0.01	F=15.934,p<0.01
Mayors'office	0.499(0.028)	0.06(0.235)
NYCgov	0.365(0.042)	0.04(0.195)
NYPD	0.292(0.051)	0
FDNY	0.454(0.064)	0.26(0.443)
NYOEM	0.236(0.014)	0.01(0.102
NotifyNYC	0.452(0.016)	0.05(0.216)

To explore how often did the public post question and government agencies reply on social media(RQ2), a calculation was performed for both public question and government reply to public question frequency. The results (Table 4) suggest agencies had difference in public question indicator (F=61.537,p<0.01) and government reply indicator (F=15.934,p<0.01). FDNY performed both great in public question and government reply.

IV. DISCUSSION

A. Public and government had different interests in crisis

Interestingly, we found the public and the government didn't share the same attention in crisis on social media. This can be proved in fig 2, not those ranked in the front in government frames got front position in public attention rank lists. There are some indicators had obvious difference need to be discussed.

First is the engagement invitation indicator, from this indicator's difference between public attention and government, we can see that government did put some attention to engage the public in crisis. The invitation mainly contented two kinds of things: one was asking for the public's coordination in crisis relief action like not occupying emergency road; the other one was calling for volunteers to join the recovery action like working in shelter, donating money and clothes. And each

invitation was wide widespread by public with many re-tweets. Also, the public frequently reply the government posts quickly. We can draw a conclusion that public had the passion to participate in crisis response. Reassurance and government coordination also got more attention which may indicate that public want to see the coordination between government agencies and need more confidence when face the disaster.

Another obvious difference was that leadership framed many times by government but ranked the last in public attention. The posts about mayor Bloomberg's crisis leadership actions, even present Obama's crisis related speech or actions, got very little re-tweets or replies. Some public even gave very negative reply, pointed out the leaders should pay attention to response to crisis, not to show off themselves on social media.

Few instances of rumor were founded, where departments corrected misinformation through their online communications. A frequent concern that emergency response organizations have with the public's online communication is with the credibility and accuracy. These findings suggest that the presence of online rumor is not as much of an issue as some may fear.

A. NYC government had a relatively high interaction with public

Unlike many research before in which government rarely had interaction or two-way information sharing with public(Waters and Williams 2011, Denef, Bayerl et al. 2013), our study indicates that government agencies of NYC had a relatively high interaction with public. First, public engagement invitation has a quite high number of government frame during Hurricane Sandy. I/We also find that public re-tweeted those invitation most. From the government frames and public attention section, we can find the NYC government agencies had the will to lead the public engage in crisis response, and the public enthusiastically responded. Within all 5 departments we studied, except there were no public post question on NYPD's twitter account, the other four agencies all replied to public question. The FDNY even has a 68.6% reply rate, which is higher than the result of Waters and Williams (Waters and Williams 2011): government accounts reply 17.6% of all the direct messages posted by the public using Twitter's @reply function.. We can see that the NYC government agencies especially the FDNY reply to public more frequently, which indicate more interaction with public.

The special situation in crisis and the excellent work of NYC government may be the reasons why more interaction. Crisis often happened from routine and around citizen, which involved more public than some other affairs, the needs of government quick response and coordination in crisis and the easy rise of misunderstanding all require more transparency and democracy in decision making process and policies execution in crisis environment. Some researchers before compared governments with different levels of public engagement in front of crisis, and found that the government had more extensive citizen participation initiatives experienced more political stability and citizen satisfaction; on the contrary, the one with less participation had experienced changes in government structure, turn-over of elected and appointed officials, and much less positive citizen evaluation(Kweit and Kweit 2004). Also the comparision between London Metropolitan Police (MET) and the Greater Manchester Police (GMP) also indicated that more participation and closer relationship to the public lead to greater tolerance for mistakes. Both the former research suggested that governments need to involved public more in crisis situation.

In the other hand, the New York City government realized the important of social media in crisis management, and did an excellent job in their early work. Since Hurricane Irene in the fall of 2011, New York City has leveraged social media for a variety of purposes, enabling the city's services, offices, and departments to engage and inform the public through digital channels (e.g., Facebook, Twitter, YouTube). In fact, since Irene, most of the city's services, offices, and departments have a digital presence in some form. In 2011, after Irene, the City established a Social Media Emergency Protocol. This document is assessed periodically and updated as necessary, reviewed by the City Hall and City communications teams, and sent to all social media managers to ensure their familiarity with the process. The Social Media Emergency Protocol is a clear and concise document, requiring that all messages sent out during a disaster be approved by City Hall. The document provides a list of six or seven approvers (for continuity purposes) and reminds the social media managers that any message sent from the main City account (@NYCgov on Twitter) can be re-tweeted or shared without approval. The document also offers direction on the tone of voice required of all messages (authoritative but calm), and format considerations (e.g., no capital letters for emphasis and no exclamation points). The document reminds all social media managers to remove any scheduled tweets, to ensure that all messages provided during an emergency are standardized, appropriate, and applicable to the event at hand. Following Irene, the City developed SMART, the Social Media Advisory and Research Taskforce, a group of 15 people from various agencies across New York City who are considered to be the "social media rock stars." Since Irene, this group has met once a month to review best practices and guidance documents like the Emergency Protocol. Once a document is reviewed, it is placed on the City Intranet so that it is accessible to all City employees. In Sandy, social media and digital resources were critical to the City's ability to manage its public communications efforts during the storm and in the weeks of recovery.

A. The interaction with public may influence the public attitude

From tale 7 we can see the public attitude towards government hurricane sandy response was just a little more negative (23%) than positive (19%). The reason influencing public attitude government response diversified in different response period. In the first week after hurricane sandy got landfall (Oct. 27th –Nov. 3rd), the government took action of quick response, like closed public parks, school and transportation, order particular areas to evacuate and update hurricane situation, during this period, the negative reply is more possible caused by conflict orders and inaccurate information. @NYCMayorsOffice posted "Mayor: We are not ordering any evacuations as of this time, in any part of the city." at 3:32 PM, Oct 27, but just after no more than one day, at 8:27 am, Oct 28, @NYCMayorsOffice posted "Mayor has issued

mandatory evacuation order for all of Zone A. Find your zone and nearest shelter" and just after that it posted another information of "Mayor: If you don't evacuate, you're not just putting your own life at risk; you're endangering first responders who may have to rescue you." Many replies expressed people's unsatisfaction that the mayor's order changes so soon; they can not open the evacuation area map ; and workers in public sectors were still required to go to work even if the public transportation were closed. In the quick response period, the main negative attitude were the public thought the unfair treat to different districts, like many social media user argued that too many resources were put into Manhattan than any other regions. From the negative comments, we can find that the government should have more transparency about their crisis response action and it should avoid conflict orders and inaccurate information.

Despite the general negative attitude having similar amounts to positive attitude, each department had different comments. Office of emergency management and NYPD obviously receive more negative replies than positive replies, while FDNY and NYC government had more positive replies than negative replies, and FDNY have the top proportion of positive replies among all agencies. Meanwhile, the rank of the reply rate were FDNY, NYC government, Mayor's office and Office of emergency management office. The reason for FDNY got such a high positive reply may be that it is the agency enecting all the policies and deal with direct response such as rescue and repair, so it faced the public more often. Another possible reason was that FDNY almost reply to every question the public post on their social media account, which clarify more misunderstanding about their work and gave the public more help. But at twitter account of mayor's office, the government agencies rarely reply the public question and the few reply was given by NYC government and other government agencies instead of itself, giving it more negative comment. So we can suppose that the more interaction with public on social media the government had, the more positive attitude they may have.

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