# Facebook and Twitter Adoption by Hurricane Sandy-affected Police and Fire Departments

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**ABSTRACT**

We report initial findings around the Facebook and Twitter adoption trends of 840 fire and police departments affected by Hurricane Sandy. The data show that adoption increased during the time period directly surrounding Hurricane Sandy. Despite this increase, the creation of new online accounts since that time has been declining and overall adoption rates seem to be stabilizing. Lastly, the data report Facebook to be significantly more popular than Twitter as a form of online communication for these fire and police departments.

**Keywords**

Crisis informatics, disaster, emergency, social media

**INTRODUCTION**

The widespread adoption of online communication media—particularly social media like Facebook and Twitter—has introduced new ways for emergency responders to share information and interact with the public. For example, researchers report that the London Metropolitan Police (MET) and the Greater Manchester Police (GMP) used Twitter during the London Riots of 2011 to communicate their response efforts and the dangers to public safety (Denef, Bayerl and Kaptein, 2013). In other research, Hughes and Palen (2012) examined the emergency public information officer (PIO) and how they have been affected by social media. This study reports that though technologies like social media show potential for emergency response, their adoption poses many challenges such as issues of credibility and trust, lack of support from management, lack of resources, and lack of training. Much of the research in this area has observed slow adoption by emergency responders and a tendency for those who have adopted social media to use them as a one-way communication stream to push information to the public (Sutton, 2010; Latonero and Shklovski, 2011; Hughes, St. Denis, Palen and Anderson, 2014; Hiltz, Kushma and Plotnick, 2014).

A few recent studies have looked at how emergency responders have adopted and used social media within a wider crisis response effort. Sutton and colleagues (Sutton, Spiro, Butts, Fitzhugh, Johnson and Greczek, 2013) examined Twitter use by emergency responders during the 2010 Deepwater Horizon oil spill. By examining network structure and conversational features, they could better understand how information was exchanged and disseminated. Results showed that health and public safety organizations tend to be more centrally located in social media networks, which makes them ideal communication partners for information distribution. More recently, Sutton et al. (2014) looked at the Boston Marathon Bombings and how emergency responders amplified messages sent through Twitter by retweeting these messages.

The preliminary research reported here builds upon a recent study by Hughes et al. (2014) that examined the online communications of fire and police departments during Hurricane Sandy (2012). In this study, researchers identified 840 fire and police departments located in the coastal regions within a 100 mile radius of Hurricane Sandy's landfall. For each of these departments, data were collected around the most commonly used types of online communication media, including Twitter and Facebook. The research reported low overall use of online communication media during Sandy, and suggested that better understanding of the reasons for this low use could reveal opportunities to increase its use and value to the emergency management community.

Until recently, longitudinal study of social media adoption trends has been difficult to conduct—enough time had not passed and the data simply didn't exist. Yet these trends can 1) help emergency responders understand what types of social media are most effective, 2) help researchers understand current communication behavior and model future behavior, and 3) help members of the public understand to what types of media they might look to for information from emergency responders. Here, we expand the scope of the Hughes et al. (2014) study to consider how these Sandy-affected fire and police departments have adopted Twitter and Facebook over time and how Hurricane Sandy may have affected that adoption.

## EVENT OF STUDY - HURRICANE SANDY

After Hurricane Sandy began in the Caribbean Sea on Oct 22, 2012, it tracked north, hitting Jamaica, Cuba, and Haiti. The hurricane finally made US landfall in Brigantine, New Jersey as a Category 2 hurricane on Oct 29, 2012. Hurricane Sandy caused 117 deaths and cost approximately $50 billion USD in damages (Blake, Kimberlain, Berg, Cangialosi and Beven II, 2013). In the US, Hurricane Sandy severely disrupted the northeast coast, damaging or destroying over 650,000 homes (Blake et al., 2013) and displacing roughly 776,000 people (Yonetani, Holladay, Ginnetti, Pierre, Wissing, Morris and Natali, 2013).

## RESEARCH DATA & METHODS

To supplement data from Hughes et al. (2014), we collected the date when each of the 840 departments created its Twitter or Facebook account (if an account existed). First, we updated the list of accounts by searching Facebook and Twitter to determine if the fire and police departments that did not have an online account(s) in Hughes et al. (2014) have since created one. To accomplish this, we used the search interface of Facebook and Twitter and entered key terms associated with each department's name and location. A department had to have a publically-accessible Facebook page to be marked as having a Facebook account. Next, we determined when each fire and police department created their Facebook and Twitter accounts to understand when departments adopted these media. We found the account creation dates (if applicable) by visiting each department's Facebook page and pulling account information from the Twitter API.

Once we collected the creation dates for the Facebook and Twitter accounts, we performed two analyses. First, we determined the number of accounts created during three time periods (see Table 1): *Pre-Hurricane Sandy* (the year prior to the event), *During Hurricane Sandy*, and *Post-Hurricane Sandy* (the year following the event). This analysis contributes to understanding what impact Hurricane Sandy may have had on the creation of social media accounts. For our second analyses, we separated the creation dates by year to better understand the adoption rate of Facebook and Twitter over time. The years accounted for in this analysis start with the year each medium was founded (2004 for Facebook and 2006 for Twitter) and continue through 2014.

| Period | Time Frame |
|---|---|
| Pre-Hurricane Sandy | October 25, 2011 - October 24, 2012 |
| During Hurricane Sandy | October 25, 2012- November 9, 2012 |
| Post-Hurricane Sandy | November 10, 2012 – November 9, 2013 |

**Table 1: Hurricane Sandy Event Timeline**

## FINDINGS

In this section, we report the finding of our two analysis: 1) online account creation around Hurricane Sandy and 2) online account creation over time.

### Online Account Creation Dates around Hurricane Sandy

Many (more than 43% in all cases) of the Sandy-affected fire and police departments created their Facebook and Twitter accounts before October 25, 2011—a year before Hurricane Sandy first formed (see Table 2). The next largest number of accounts (18.4% and 31.3% for Facebook and 30.2% and 22.2% for Twitter accounts, created by fire and police departments respectively) were created during the Pre-Hurricane Sandy period. Interestingly, the number of new Facebook and Twitter accounts declined during the POST-Hurricane Sandy period. These results show that adoption by these departments may have reached a saturation point, and the number of newly created accounts will only decrease moving forward. More investigation—which we conduct in the next subsection— is needed to see if these numbers continue to decrease.

| Online Media | Dept. Type | # before October 25, 2011 | # in PRE-Hurricane Sandy Period | # in During Hurricane Sandy Period | # in POST-Hurricane Sandy Period |
|---|---|---|---|---|---|
| Facebook | Fire | 193 (63.5%) | 56 (18.4%) | 4 (1.3%) | 51 (16.8%) |
| | Police | 50 (43.5%) | 36 (31.3%) | 3 (2.6%) | 26 (22.6%) |
| Twitter | Fire | 43 (44.8%) | 29 (30.2%) | 5 (5.2%) | 19 (19.8%) |
| | Police | 40 (55.6%) | 16 (22.2%) | 3 (4.2%) | 13 (18.1%) |

**Table 2: Facebook and Twitter Account Creation Dates**

Few fire and police departments created their Facebook and Twitter accounts during the Hurricane Sandy period, but, these account creations happened over a comparatively short period of time. If we calculate weekly account creation averages for the PRE-, During, and POST-Hurricane Sandy Periods (see **Table 4**), a different picture emerges. These results show that the time period directly surrounding the event showed an increase in Twitter and Facebook adoption. However, we state these findings with caution because the sample is small and may prove false or invalid with a larger sample size.

| Online Media | Dept. Type | Weekly Ave. for PRE-Hurricane Sandy Period | Weekly Ave. for During Hurricane Sandy Period | Weekly Ave. during POST-Hurricane Sandy Period |
|---|---|---|---|---|
| Facebook | Fire | 1.08 | 1.75 | 0.98 |
| | Police | 0.69 | 1.31 | 0.50 |
| Twitter | Fire | 0.56 | 2.19 | 0.37 |
| | Police | 0.31 | 1.31 | 0.25 |

**Table 3: Weekly Facebook and Twitter Account Creation Rates**

### Online Account Creation over Time

We also calculated the number of newly created Facebook and Twitter accounts for each available year (see Figure 1). The data show that new adoption rates by departments peaked in the year 2011 for Facebook and 2012 for Twitter. Following these peak years, the new accounts have been in decline for both Facebook and Twitter.
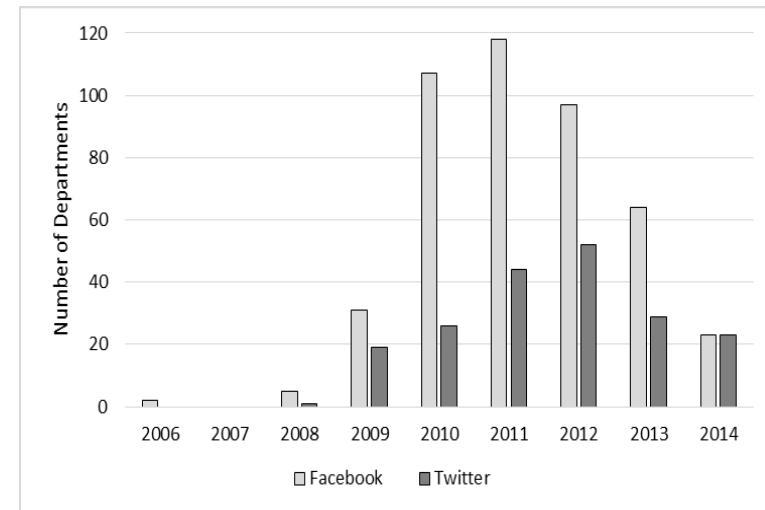


**Figure 1: Twitter Account Join Dates per year for Fire and Police Departments**

The final tally of social media accounts created by fire and police departments (see Table 4) shows that at the end of 2014, significantly more fire and police departments had a Facebook account (53.2%) than a Twitter account (23.1%). This finding suggests that fire and police departments find Facebook more useful in their public communication practices and that there is more room for adoption growth in Twitter compared to Facebook.

| Online Media | Total Number of Accounts |
|---|---|
| Facebook | 447 (53.2%) |
| Twitter | 194 (23.1%) |

**Table 4: Number of Facebook and Twitter Accounts for Fire and Police Departments**

## CONCLUSION & FUTURE WORK

In this paper, we report initial findings from our ongoing research of emergency managers online media adoption. Specifically, we examine the Facebook and Twitter adoption trends of a large sample (840) of fire and police departments affected by Hurricane Sandy.

We found that online media adoption increased during the time period directly surrounding Hurricane Sandy but then decreased in the year following the hurricane. At least in this case, we find evidence that further backs the claim that online adoption increases around a large-scale disaster event (Hughes and Palen, 2009). We suspect the decline in online adoption that occurred in the year following Hurricane Sandy is part of a larger downward trend that we saw support for in our analysis of adoption rates by year. As more departments adopt online media, there are fewer non-adopters left (though we note that there is still much room for growth). Also, it may be that those departments that are most inclined to use online media have already adopted. Declining adoption rates suggest that we may soon reach a leveling-point in which all those who are going to adopt the technology have done so. It will be interesting to see where final adoption rates settle as we continue to track these trends over time.

Facebook, at least in this dataset, is used much more frequently by fire and police departments than Twitter. Much of the research around online media use by emergency responders has been directed at Twitter, likely because the Twitter medium is more accessible to study. Yet, if Facebook use is more common, both the emergency response and research community could greatly benefit from more study of its use.

In this research, we only looked at whether Hurricane Sandy-affected fire and police departments had Facebook and Twitter accounts and when those account were created. In future research, we plan to expand upon this work to better understand how these departments used their accounts. For example, we can collect metrics (e.g., message timestamps and number of messages) that indicate how frequently these accounts are used and how account use has changed over time (i.e. increased, decreased, or stayed the same). Similarly, it would be interesting to see if changes in Facebook and Twitter policies have an impact on how these technologies are used by these departments.

Finally, we recognize that this sample—though relatively large and taken from a wide-spread area—represents a very particular subpopulation of the United States and that results may not transfer to other US or global audiences. In future work, we plan to explore and track these trends on a wider scale and for different types of emergency responders.

## ACKNOWLEDGMENTS

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