Eyes on the Ground: Emerging Practices in Periscope Use during Crisis Events

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ABSTRACT

This empirical analysis examines the use of the live-streaming application Periscope in three crises that occurred in 2015. Qualitative analyses of tweets relating to the Amtrak derailment in Philadelphia, Baltimore protests after Freddie Grey's death, and Hurricane Joaquin flooding in South Carolina reveal that this recently deployed application is being used by both citizens and journalists for information sharing, crisis coverage and commentary. The accessibility and immediacy of live video directly from crisis situations, and the embedded chats which overlay on top of a video feed, extend the possibilities of real-time interaction between remote crowds and those on the ground in a crisis. These empirical findings suggest several potential challenges and opportunities for responders.

Keywords

Social media, Periscope, Twitter, crisis informatics, emergency management.

INTRODUCTION

According to a 2015 Pew report, 65% of adults in the United States use social networking sites (Perrin, 2015). Of these, 63% consider Twitter and Facebook reliable sources of news. Twitter, in particular, is viewed as a platform for breaking news (Osborne & Dredze, 2014). Fifty-nine percent of Twitter users report following an event in real time on Twitter (Pew Research Center, 2015).

Since 2011, a new class of social media, focused around real-time video, has emerged. These include services like UStream, Livestream, YouNow, Meerkat, and Periscope. Increasingly capable cellular networks and mobile devices have made these accessible with a smart phone. Live-streaming technologies have the potential to reshape the way the people communicate, including the way emergency responders communicate with their different constituents during crisis events. Nonetheless, these new media likely pose new challenges as well.

To shed light on these advances and how they are potentially reshaping the way crisis communicators can communicate, this work examines the use of Periscope, a live-streaming application launched on March 26, 2015. Periscope was acquired by Twitter in January, 2015—before its official launch—and accumulated 10 million users with 1.85 million daily active users by September, 2015 (Periscope, 2015). These users could further complicate the distinction between citizens and journalists, potentially broadcasting from anywhere in the world with virtually no intermediaries between an event and the public, thus offering viewers a front-row glimpse of breaking news before traditional media coverage. For example, UStream was among the first to enable social sharing from mobile devices (Hardy 2013) and enabled participants of the Occupy Wall Street movement to broadcast live from New York City to people around the world (TIME, 2011).

In this paper, we focus on Periscope because we find the close integration into another social media platform—Twitter—particularly interesting. Some have argued that this relationship will give Periscope a competitive edge in the live streaming market (Exon, 2015). This integration also enables researchers to capture evidence of its

use through Twitter collections.

This research addresses empirical questions through Twitter data, including: 1) How visible (in terms of related social media) is Periscope usage during crisis events? 2) Who is using the app? And 3) How are they using it? This work explores emerging implications of Periscope use during crisis events—such as live feeds from "the ground" providing different kinds of evidence or perspectives, and citizen-reporting offering first-hand accounts without media intermediaries. We also address the issue of ephemerality on Periscope. Like Snapchat, Periscope attempts to enforce a higher level of ephemerality by making videos unavailable after 24 hours. This centrality of ephemerality in the design and use has several implications for responders and researchers. It also poses challenges for effective practical uses and data collection. Due to its recent release, there is currently very little scholarship on Periscope and live-streaming.

BACKGROUND

Social media as an Information-Sharing Resource During Crisis Events

Social media have rapidly become a core component of the global communication infrastructure, with billions of users (Kemp, 2015). During crisis events, these platforms are often appropriated by affected people, official responders, media professionals, and remote on-lookers for information sharing and gathering (e.g. Palen & Liu, 2007; Starbird et al., 2010). Researchers have noted the potential for information shared through these platforms to contribute to "situational awareness", or knowledge and comprehension about the unfolding event (Vieweg et al., 2010). While media professionals are increasingly participating via these channels, social media have also enabled everyday citizens to contribute to the situational awareness of others through "citizen journalism" (Gillmor, 2006), producing real-time updates in the form of text, photos and videos, and sharing them through networked platforms. These posts serve as informational resources for users from all over the world, who converge onto these platforms to follow the events in real-time.

Increasing Official Use of Social Media by Emergency Responders

With countless examples of effective social media use during events, both scholars and practitioners have recognized that "integrating social media into crisis communications is essential" (Baron, 2015). More recently, Andrews et al.'s (*forthcoming*) study using a large Twitter dataset showed that 'official accounts' (news media, organizations/companies, and governmental agencies) have a definite impact on rumor propagation during crises insofar as they can slow the spread of a given rumor, thus, reinforcing the need for crisis communicators to have formal social media strategies in place.

Live-Streaming: Periscope

Periscope is a live-streaming service which enables people to stream and watch videos from around the world. The idea of the app occurred to one of its two developers and co-founder, Kayvon Beykpour, when he sought information on Twitter about the Taksim Square protests in June 2013, but felt he was missing a real-time visual of the situation (Shontell, 2015). Periscope's corporate website makes their vision clear: "What if you could see through the eyes of a protester in Ukraine?" and claims that its co-developers wanted to create the "closest thing to teleportation" (About Periscope, 2015). The founders' vision was realized on launch day, when people used Periscope to live-stream an explosion and resulting fires in New York City. Their live-streams provided rapid evidence in support of its capacity to stream video of any event that at least one person with a smart-phone deemed worthy of sharing.

The Periscope app allows users to browse on a world map or view videos (or "scopes") in a list. Although the focus is on participative *live* video, Periscope preserves the video for 24 hours, viewable with a URL link or from the phone application. Viewers can interact in real-time through text chat, and broadcasters can respond textually or orally through the video. Both broadcasters and viewers can also share streams on Twitter, which enables broader exposure for their content as it spreads through a URL in the tweet. This also enables the ability to search through Twitter to find specific streams—especially if users edit the tweet to add in relevant keywords or *hashtags* that make it easily discoverable within a Twitter feed.

Periscope and the News Media

Apart from individual users, Periscope has been adopted by individual media journalists, outlets and even networks (Exon, 2015; Malone, 2015). For example the Canadian Broadcasting Corporation has been encouraging their reporters to use Periscope before/after press conferences and in the field, such as during the Baltimore protests (Malone, 2015). Beykpour explains, "Periscope has become a medium that can build truth

and empathy. If I can see what's happening in Baltimore right now through someone's eyes in a way that's raw and unfiltered and unfettered, that's truth. [People] might see a different, more rounded perspective from what's being offered on TV" (McCorvey, 2015). Although it can be argued that the broadcaster's perspective will be the one represented—since he/she will choose what is captured—it still provides viewers with a raw (unedited) footage of the event at hand.

Response organizations are beginning to grapple with the opportunities and challenges of the live-streaming platform. Some agencies are starting to offer workshops aimed at introducing live streaming tools, sometimes termed "disruptive media" (Deyerin et al., 2015) since they have unsettled the social media landscape and driven new products and practices. A current (November 2015) web search reveals a handful of Periscope videos from response agencies such as the Sacramento Fire Department and Pima County Sheriff, suggesting that practices and guidelines for engaging the public through this medium are only beginning to take shape.

METHODS OF COLLECTION AND ANALYSIS

To understand Periscope adoption and use during its first year, this research relies on Twitter data captured during diverse crisis events in 2015. Though we observed Periscope use in multiple events, in this paper we focus on three events from two time periods (Spring 2015 and Fall 2015) to offer insight into Periscope adoption across time and event type: the Baltimore protests in April/May 2015, the Amtrak train derailment in May 2015, and the flooding in South Carolina in September/October 2015. Our study is limited by our reliance on Twitter as a window into Periscope use, which had two reasons: 1) From the Periscope app, users can share stream URLs directly to Twitter, and the resulting tweets are the only remaining traces of many Periscope broadcasts; and 2) We had previously collected tweets for these events (in real-time), so we could study this phenomenon retroactively (once we recognized that Periscope was an interesting feature of these events).

Data Collection for Crisis Events

We used the Twitter Streaming API to capture tweets in real-time during each event, tracking a manually-curated list of keywords to capture event-relevant tweets and filter out noise. After the collections were completed, we added a second layer of tweet filtering to reduce noise. Therefore, each collection is based on a set of Capture Terms and a set of Filter Terms. We further reduced each dataset to a 72-hour window, focused around the peak activity in each event. Within these sets we then identified all *Periscope tweets* (defined below). The numbers of Katch mentions were also identified. Katch is an "instant cloud storage" (Katch, 2015) which enables users to permanently save a Periscope stream by appending the #*katch* hashtag to the title of the broadcast. Katch archives both the video and chat data on their site, which persists beyond Periscope's 24-hour viewing window. It was originally created for the Meerkat app, but in July 2015 an update added support for Periscope.

Sampling Periscope Tweets for Each Event

Our analyses focus on *Periscope tweets*, which we defined as tweets that contain the word Periscope in the tweet text, contain an embedded URL (in the tweet meta-data) that points to the Periscope domain, or have were sent from the Periscope app (appearing in the meta-data as their source). For each event, we examined two distinct samples of Periscope tweets: 1) a random sample of 20 event-related tweets, and 2) a top-retweeted sample of 20 event-related tweets. We use a random sample to look at representativeness of the streams in our set, and the top-retweeted as a proxy for salience.

Methods of Analysis

For each tweet in these samples, we attempted (at the time of our research in November 2015) to resolve any links in the tweet and track down any digital traces of the original content. To assess persistence of this content, we recorded for each tweet whether or not the original link was still active, whether it pointed to video or other content, and whether we were able to find other traces of the original content of that link. To understand the reach and popularity of this content, we included the number of retweets in our analysis. Finally, to understand who was using Periscope and why, we identified the Twitter and Periscope profiles for the author of each tweet and noted any affiliated organization for the feed.

We then conducted qualitative analysis of the tweet sample for each event, incorporating a) the tweet content; b) existing digital traces of the original content; c) retweet counts; d) the author profiles; and e) public information about any affiliated organization. The aim of this qualitative analysis was to understand the use of Periscope through the kind of conversations that were happening during the event. The most salient and representative Periscope tweets were selected to illustrate these conversations and further enlighten our research and conclusions.

Event	Collection Dates (2015; local time)	Keywords (Capture terms; case insensitive)	Keywords (Filter terms; case insensitive)	# of tweets	# of Periscope mentions (text, links)	# of Periscope Links	# of Katch tweets
Baltimore Protests	Apr 27th 17:33 – Apr 30th 17:33	baltimore,protests,riots,looting looters,rioters, FreddieGray, Freddie Gray, baltimoreriots, curfew, baltimoreuprising	Baltimore, protest, riot, curfew	5,867,653	4,014	1,585	14
Amtrak Crash	May 12th 10:57 – May 15th 10:57	amtrak,train crash,train wreck,amtrackrash,philly,philadelphia	amtrak, crash, train, wreck, derail	537,410	237	147	7
South Carolina Floods (SC Floods)	Oct. 2nd 07:00 – Oct 5th 07:00	flood, floods, flooded, flooding, charleston, scflood, scfloods, scflooding, scwx, scfloodrelief	sc, scflood, chs, south, charleston, hurricane, joaquin, historic, catastrophic	148,665	1,042	882	262

Table 1. Collection Details for Each Event: Tweets and Periscope Mentions

RESULTS

Examining Periscope Use during Three Crisis Events in 2015

We examined Periscope use through tweets collected during three distinct crisis events that occurred between Periscope's launch at the end of March 2015 and October 2015. Though compared with the overall volume of tweets the number of Periscope mentions is low, we nonetheless find a significant record of Periscope activity there. Table 1 shows the number of Periscope tweets for each event.

Baltimore Unrest: April 18, 2015 to May 6, 2015

Starting on April 18, 2015, residents of Baltimore, Maryland protested the mistreatment of Freddie Gray, an African American man who had been arrested six days prior, and who had sustained severe injuries while in police custody. Following Gray's death, protests grew more violent, leading to fires, looting, and injuries with over 250 people being arrested. The Maryland Army National Guard was deployed and a state of emergency with a curfew was declared for the Baltimore area (Calamur, 2015; Ortiz, 2015).

Periscope tweets posted during the event show the app being used by citizens and professional journalists for documentation of protests, press conference coverage, live on-location interviews, as well as for discussion and commentary. Paul Lewis, a Guardian correspondent, made particularly heavy use of Periscope to cover the event, authoring 26 Periscope tweets, including 10 (like Tweet 1, Table 2) that contained active streams. His tweets were retweeted 296 times, and he was mentioned in 166 other tweets.

Tweets from this event also provide insight into higher-level commentary and reflections about the use of Periscope for citizen journalism (Tweet 2). As observers struggled both to understand the events unfolding and the role that Periscope might play within them, Periscope use in Baltimore and particularly Lewis's use of it became a topic in its own right in social media and traditional news outlets, with several tweets linking to this derivative content—e.g. to blog posts describing Lewis' Periscope feeds.

#	Author	Tweet	Type	# of RTs
1	@PaulLewis	LIVE on #Periscope: Baltimore now- just before curfew falls https://t.co/joFBwlm9JD	Stream Post: Reporting	51
2	@Jennjenn255	Baltimore is the scene of the next iteration of "periscope journalism": superb, live interviews on ground http://t.co/GZJubxFmRl #jour147	Periscope Reflection	0
3	@VeryWhiteGuy	Any streams or periscopes out of #Baltimore ....pls @ me...I cant with the mainstream coverage	Requests for Streams	4
4	@nova_mjohnson	LIVE on #Periscope: Can we just talk about these riots...I need to vent :(https://t.co/A09KIrYU1r	Stream Post: Commentary	0

Table 2. Selected Periscope Tweets from Baltimore Protests

Amtrak Train Derailment: May 12, 2015

On May 12, 2015, at 9:23 p.m. (EDT) an Amtrak Northeast Regional passenger train traveling from Washington, D.C. to New York City derailed and crashed near the Port Richmond neighborhood of Philadelphia, PA. Eight people were killed, and 200 were injured, requiring treatment at the site and in nearby hospitals. The event was followed by a long investigation into the cause of the accident (Sisak 2015; Stolberg et al. 2015).

Tweet data from that event show Periscope being used to cover the derailment on scene, to interview at least one passenger (Tweet 9), and to broadcast a press conference with Philadelphia's mayor, Michael Nutter (Tweet 6). According to the tweets, an on-the-scene Periscope broadcast was available before CNN Breaking News notifications went out (Tweet 7). The single most retweeted Periscope broadcast was the Philly Inquirer's helicopter footage of the crash site on the next morning (Tweet #5), with 23 retweets.

#	Author	Tweet	Type	# of RTs
5	@PhillyInquirer	Philly.com is flying over the #Amtrak crash site, covering it live on Periscope. https://t.co/0EERJEsLAi	Stream-post: Reporting	23
6	@brittanymwehner	LIVE on #Periscope: Philadelphia Mayor Michael Nutter speaks on Amtrak derailment https://t.co/iFNQr51tsA	Advertising future stream	3
7	@MikeKhristo	Over 30min after the first @periscopeco went live at the scene of the Amtrak train, @cnnbrk finally breaks the news. cc @jess	Periscope Reflection	1
8	@Noah_L	Watching live footage from scene of Philly Amtrak derailment on @periscopeco...this is the future of reporting. #Amtrak #Periscope	Periscope Reflection	3
9	@gtoppo	LIVE on #Periscope: In @Philly, #amtrak passenger Jeff Kutler talks to media... https://t.co/cH4Pmj29rk	Stream-post: Reporting	10

Table 3. Selected Periscope Tweets from Amtrak Train Derailment

South Carolina Flooding: September 29, 2015 through mid-October, 2015

In October 2015, a historic amount of rainfall was observed in the southeastern United States, with the majority being in the state of South Carolina. Tropical moisture from the Gulf of Mexico combined with indirect rains from Hurricane Joaquin resulted in as much as 24 inches of rainfall in parts of the state (Sosnowski 2015). The heavy rainfall persisted for more than a week and resulted in catastrophic flooding and losses that could surpass $1 billion (Bacon, 2015).

Tweets show Periscope was used by national media as well as by local citizens. Text in tweets indicate locals used Periscope in a variety of ways: to show flood damage (e.g. Tweets 11 and 13), share flood-related information pertinent to businesses, suggest topics for flood-related sermons and also simply to show the weather. Tweet 11, sent by a representative of the Charleston Animal Society, promotes a stream that seems to have information about current conditions at the facility. Interestingly, though the text in some tweets promoting Periscope feeds was generated by the stream's creator, other tweets contain comments from the crowd—for example, Tweet 12 was posted by an individual outside of South Carolina and appears to contain a comment about what that individual was seeing in a live feed from the affected area.

The Weather Channel was the most prominent user of Periscope during the SC floods, repeatedly broadcasting Periscope feeds (11 Periscope tweets, 6 contained URLs to their stream)—and archiving them using the newly available Katch service (e.g. Tweet 10). Across their 11 Periscope tweets, they were retweeted 295 times.

#	Author	Tweet	Type	# of RTs
10	@weatherchannel	|REPLAY| BREAKING: Potentially Historic Flooding For The Southeast #katch #Periscope http://t.co/NJCGtKU3Qr http://t.co/MvVN1MMIWJ	Stream-post: Reporting	22
11	@KayHyman	LIVE on #Periscope: Flooding at Charleston Animal Society Animals safe on high ground play yards completely flooded… https://t.co/ebmb5RAVXE	Stream-post: Reporting	0
12	@ivan91	#Periscope: Man trapped in truck! #scwx #SCFlood Floating away! Cab filling up! https://t.co/eufrnYkIPo	Comment on Stream-post: Reporting	14
13	@punkmanmatthew	LIVE on #Periscope: Just got home in South Carolina. Still pouring rain. Flooding around the house starting. https://t.co/vRnuHEBt0K	Stream-post: Reporting	0

Table 4. Selected Periscope Tweets from South Carolina Flooding

Emerging Communities and Practices on Periscope

Periscope as a New Tool for Professional Journalists

Perhaps contrary to a sentiment about social media diminishing the role of traditional journalists (Lewis, 2012), the tweet record shows users associated with mainstream media outlets to be among the top Periscope users during each of the three events we studied. During the Baltimore Protests, the most prominent Periscope feed was operated by Paul Lewis of the Guardian. For the SC Floods, The Weather Channel left the biggest Periscope footprint. Though there was no single outlet that dominated the Amtrak Crash coverage in the same way, out of the 20 random tweets for that event that had a source for the Periscope feed, that source was always a news outlet or journalist. For example, photojournalist Joe Kaczmarek used Periscope on scene shortly after the crash—and according to @MikeKhristo (Tweet 7, Table 3) this was 30 minutes before CNN broke the story. His feed was retweeted by several news outlets and was also featured by Periscope's Twitter account @periscopeco. These high levels of activity and visibility for mainstream media align with (and perhaps in this case reflect) an increasingly accepted view of Twitter as a news-production and distribution platform (Kwak et al., 2010; Osborne & Dredze, 2014).

Many of the Periscope streams produced by mainstream media align with previous media practices in terms of the content—e.g. after the Amtrak crash, Kaczmarek's feed gave a view of the crash site from the ground, the Philadelphia Inquirer used it to broadcast while flying over the wreckage, and other journalists used the platform to cover a press conference and interview survivors (Tweets 5-9, Table 3). In these cases, Periscope appears to provide a lightweight means for an individual reporter, or perhaps a small team of reporters, to share content from the scene of events without substantial equipment.

Digital traces in the tweet data from the SC floods (which occurred several months later) show The Weather Channel utilizing Periscope for new forms of hybrid participatory journalism—streaming special interactive broadcasts directly to the platform. An anchor and a meteorologist provided local forecasts for watchers, showing video of the floods. They also solicited Periscope users in affected areas to participate in live chats associated with their broadcasts.

Periscope Facilitating New Forms of Sharing and Sensemaking within the Crowd

Not surprisingly, the tweet record shows Periscope being used by citizen journalists as well—individuals near the scene of events can now share live video feeds of the situation as it unfolds. For examples, during the SC floods, several Periscope users who were not affiliated with media organizations posted live updates about the flooding conditions, including damage to their homes and businesses. Periscope users and Twitterers were also able to comment on these live videos, occasionally drawing attention to newsworthy events within the content (e.g. Tweet 12, Table 4).

In addition to live feeds of unfolding events, the tweet data from the Baltimore event shows another type of stream focused primarily on commentary about the unfolding event. Though not among the sample of top-retweeted, several tweets within the random sample of that event contain links to Periscope feeds that appear to have been streamed commentary or discussion.

At the time of these events, all within months of Periscope's launch date, Periscope and Twitter users were reflective about the impact that this new platform would have on information-sharing during crisis events. Many of the tweets in our Periscope-related samples, especially the samples from the Baltimore Protests and Amtrak Crash events, contained comments about this perceived value (Tweet 2, 7 & 8), which all suggest that Periscope was already changing journalism and citizen reporting.

Ephemerality and Persistence of Periscope Tweets

Similar to other social media such as Snapchat, the Periscope site features an element of ephemerality—it removes each video after 24 hours. URL links to "old" Periscope streams resolve to an expiration page. It is (intentionally) impossible from the Periscope platform to determine what a Periscope video once contained. However, there are often traces of these videos—including textual descriptions, screenshots, and in some cases copies of the videos—left behind in tweets and on other social media sites and websites. We were able to find visual traces for 20 streams mentioned in all our samples, but these traces reveal a tension between ephemerality and persistence in Periscope feeds. Within the 20 randomly sampled Periscope tweets from the Baltimore set, ten contained links to actual Periscope video feeds. A web search revealed four of those ten videos to still be available (in a copied form) on the Guardian website months later. However, these copies contain only the raw broadcast video—i.e. they are missing all of the users' comments that would have been visible through Periscope during the live broadcast. We also found screenshots of two streams in the tweets. These screenshots provide a glimpse into the broadcast, but for some the content was difficult to see and decipher. Thus, though some Periscope content persists beyond the 24-hour window, this content is often diminished in significant ways—some aspects of Periscope remain ephemeral.

Emergence of New Tools to Support Preserving Periscope Content

For the small number of tweeted Periscope videos that we identified as having left some trace, these traces appeared in a variety of ways—in Storify compilations, in YouTube videos, blogs and news sites. However, by far the most common traces came from Katch, a service that debuted between the Baltimore Protests and the SC Flood event. Katch enables users to permanently save a Periscope stream and its comments by adding the #katch hashtag to a broadcast title (see Tweet 10, Table 4). In the SC Flood sample, The Weather Channel heavily used Katch to preserve their content.

However, despite the introduction of Katch, we still had difficulty finding content from several streams in the SC Floods event (and another more recent event not covered in this paper). This suggests that either users have not yet learned about Katch, or (more likely) that some video streamers in the crisis context are comfortable with or appreciative of the ephemerality it affords.

DISCUSSION & CONCLUSION

In this paper, we analyzed the usage of Periscope during three diverse events, using tweets as digital traces of (technically ephemeral) Periscope activity. Our goal was to provide insight into live streaming as an emergent medium, specifically within the context of crisis events. This study demonstrates that Periscope has quickly become an information-sharing resource during crisis events, perhaps not surprisingly considering its initial design and implementation were inspired by political protests. Periscope has been adopted by citizen and professional journalists to report breaking news, often from the "ground" of these events. And, some Twitter users within the crisis event data we collected claim that live-streaming from smart phones is already changing how crisis events are covered.

Tweet samples from each event show a few common behavior patterns, including: promoting and linking to

existing streams, commenting about a stream's content, and reflecting about the new potential of live-streaming journalism. The tweet data also show two different types of Periscope streams: event reporting and event discussion. The first set consists of people reporting directly on the event either as it unfolded or shortly after it occurred. In some cases these reporters were at the scene, though not always. For example, in the SC Flooding event, we see the Weather Channel provide both on-the-ground coverage and studio footage. The second type of streams are discussion streams, often hosted by non-journalists, that began soon after a crisis event and occur sometimes days after the event as people try to interpret and make sense of the event.

Interacting with Remote Eyes on the Ground

These tweets suggest that the affordances of this platform change the interactions between those reporting and receiving information in interesting ways. Periscope users create their own agenda and decide what and how they will report. These feeds can therefore result in unfiltered footage as events unfold, a potential that one viewer pointed out may be "unnerving." The audience can participate in the conversation, interacting directly with these remote eyes on the ground to provide feedback, ask questions, and even suggest new coverage strategies or new angles. As we see in Tweet 3 (Table 2), people are using both Twitter and Periscope to request live video coverage of events as they occur from multiple perspectives and points of view. Though we found little evidence that these tweeted requests influenced how coverage occurred during these three events, we imagine in future events requests for specific coverage may encourage citizens to start feeds or alter how an event is covered.

Potential Use of Periscope as a Tool for Emergency Responders

Live streaming could become a game changer for emergency management, allowing Public Information Officers (PIOs) to become broadcasters and, by taking charge of their own content and skipping intermediaries, to reduce both the time it takes to reach the public and the risk of misinterpretation or miscommunication (Muller, 2015). Though we were unable to find any record of formal responders using Periscope in the tweet samples from these three events, public records of recent gatherings of emergency responders and personal communication with emergency managers suggest that Periscope is definitely on their radar. Clearly, responders could adopt the tool for outgoing communication—using it to cover their own press conferences or to make reports from the scene of events.

It could also become an important source for incoming information. The potential for gathering real-time video feeds from multiple and distributed witnesses at the scene of disaster events—and perhaps more important the ability to interact directly with these eyes on the ground—offer interesting and concerning possibilities for professional crisis responders. Certainly, Periscope and other live streaming services provide a new form of content that can be valuable both due to the richness of the information shared and the potential ease in verifying that information—i.e. a live video represents a different kind of evidence and may be more credible than a textual message or an image. Additionally, the ability to direct users to adopt new perspectives or move to new locations might allow responders to fill critical holes in the current state of knowledge about an unfolding event. In the Twitter data of recent crisis events, citizens and journalists are already making these types of requests. However, this potential brings up clear safety and liability concerns. Conversely, emergency responders may use the comment feature within live Periscope broadcasts to provide safety messages, essentially leveraging the public's information-production as a new channel for their own messaging.

Another important factor to consider is the feature of ephemerality and the fact of varying levels of permanence. Though Periscope feeds (including the video content and the live textual commentary) self-destruct after 24 hours, traces of these feeds remain on various social media platforms and websites. This content is therefore neither permanent nor completely ephemeral—a tension that will be especially important for emergency responders as they consider the legal and ethical implications of using the site (as a producer, consumer, or commenter) and how they grapple with systematically monitoring and keeping a record of the data.

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