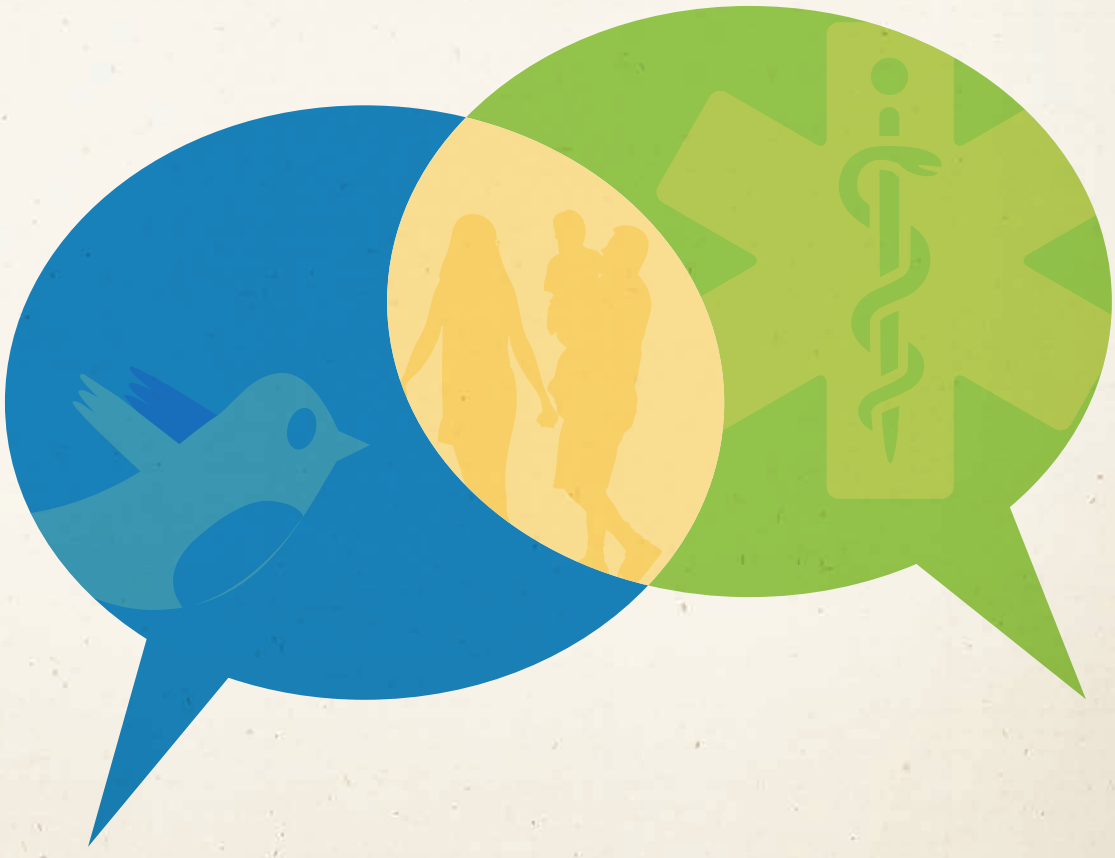
2011 Social Media + Emergency Management Camp

Transforming the Response Enterprise

Clarence Wardell III
Yee San Su



September 2011

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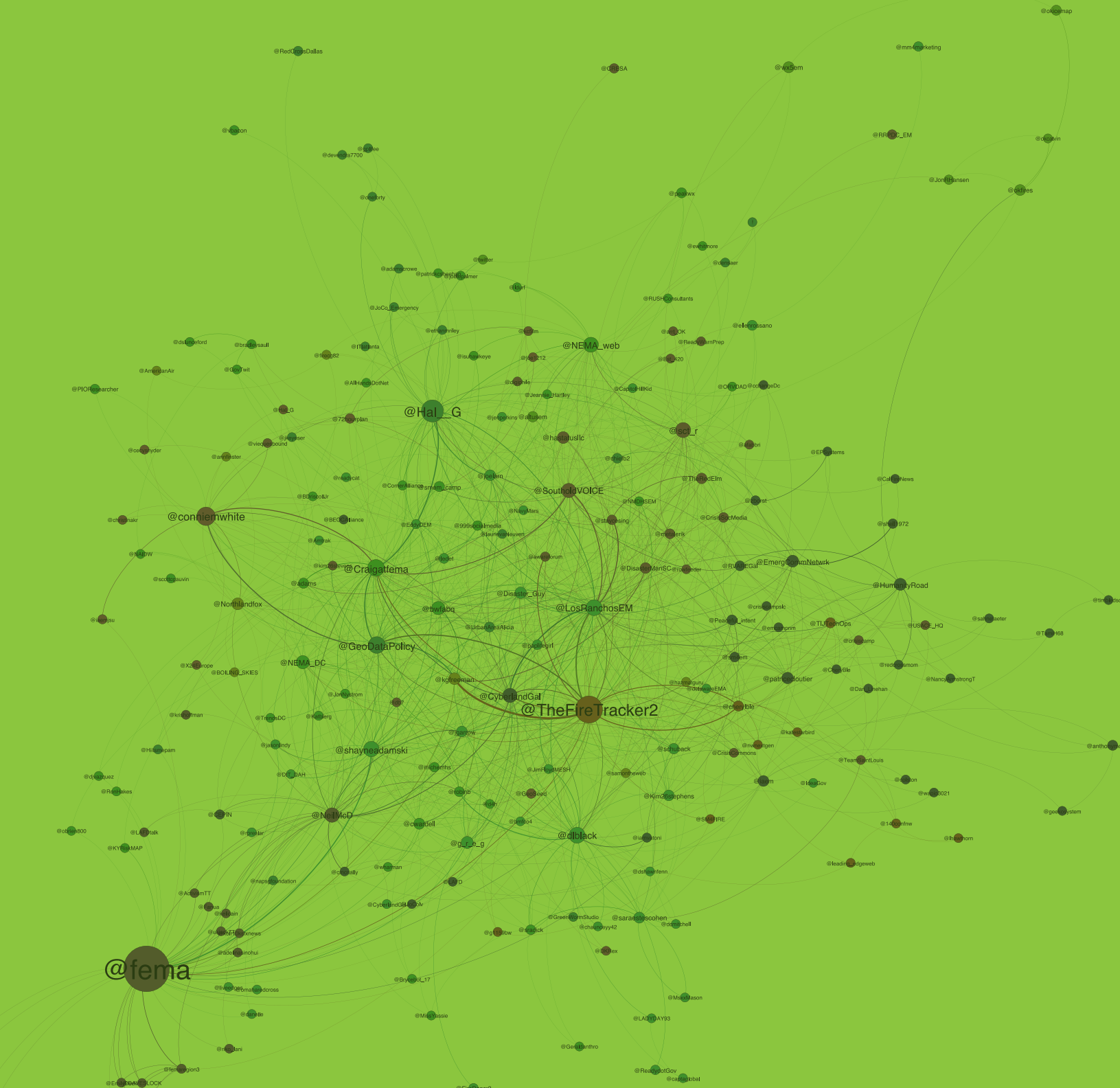
The figure represents a subset of the conversation that took place between individuals via Twitter© during the 2011 Social Media in Emergency Management (SMEM) Camp at that National Emergency Management Association (NEMA) mid-year conference, as captured via the #SMEM11 hashtag designated for conference use. The network visualization captures directed conversation between individual accounts, as defined through "@-mentions" on Twitter. When individual A mentions individual B in a tweet, an arc from one node to another is used to capture that relationship on the graph. The size of the node and its label (Twitter unique names) is proportional to the number of other nodes it is connected to on the graph (only nodes that have at least two connections are included here). The nodes and edges are colored according to the "community" to which the node belongs, as determined by the set of individuals who were most closely related through their Twitter mentions.



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Transforming the Response Enterprise

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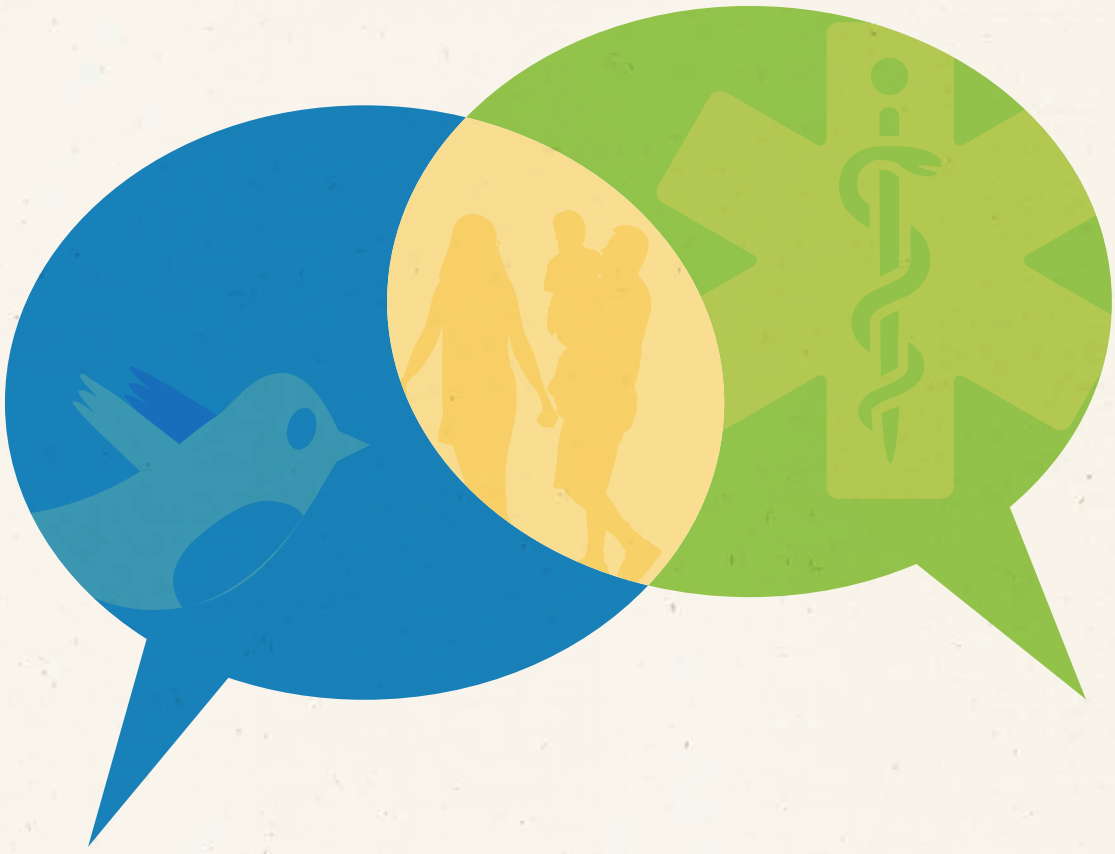

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Acknowledgments

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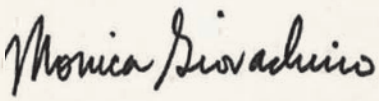


Monica Giovachino
Managing Director

This document represents the best opinion of CNA at the time of issue, and does not necessarily reflect the opinion of all those who provided feedback or appear quoted within.

Contents

Executive Summary

On March 24, 2011, more than 150 members of the U.S. emergency management community convened for the 2011 Social Media in Emergency Management (SMEM) Camp (the Camp). This was the first time members of this community convened on such a large scale to discuss how social media and emerging technologies are affecting response operations. Hosted by the National Emergency Management Association and the SMEM Initiative, in collaboration with CrisisCommons, the event included representatives from Federal Emergency Management Agency (FEMA), the American Red Cross, Twitter©, state and local emergency management agencies, private sector interests, and various volunteer technology communities (VTCs).

The Camp was a direct response to changes in societal expectations of emergency responders (e.g., the timeliness of response) brought about by the emergence of social media and related technologies over the past decade. One of the Camp's objectives was to capture discussions and develop a white paper that highlights not only the challenges of integrating new technologies and opportunities into traditional U.S. response structures, but also examples of best practices and opportunities for future engagement and training.

Purpose and Approach

Working with event organizers from CrisisCommons and the SMEM Initiative, CNA led a volunteer research team to record discussions at the Camp. Our team analyzed data from pre- and post-event surveys and a constructed archive of comments posted to Twitter, a social media site, issued during the event.

To help synthesize the diverse spectrum of information gathered, we have treated the domestic response community as a large-scale system—an enterprise consisting of numerous stakeholders, inputs, and processes that work together to save lives. Moreover, we employed a theory of enterprise transformation to frame the discussion of areas that need to be addressed in order to capture the potential value of integrating social media and other related technologies in response. In particular, we identified six critical areas, or inputs:

1. Resources
2. Laws, policy, and guidance
3. Engagement and community-building
4. Buy-in and adoption through demonstrated value to others
5. Reliability and verification
6. Structure and integration

Key Findings

Camp discussions revealed that, despite progress in each of these six areas, a gap remains between the way in which many advocates for social media adoption in the emergency management community would like to see these technologies used and the way in which they are currently being used. To date, these technologies have been predominantly used by public information officers (PIOs) to disseminate information to the public and monitor streams of publicly available information. Although these are valuable uses, Camp participants expressed a desire to see additional uses of these technologies (e.g., using survivors as additional sources of situational awareness information). The gap between the current state and the desired state of social media usage persists in part because of considerable concerns and challenges that remain in the six identified areas, not the least of which is the need for total buy-in at senior leadership levels.

The body of the report contains area-specific findings. However, at an aggregate level, Camp discussions revealed:

- The need—akin to FEMA's whole community initiative—to redefine the domestic response enterprise to be more inclusive of all response stakeholders (e.g., individual citizens and private sector organizations), not just governmental organizations. Further work is needed to spell out exactly who these players are, what structures guide their interactions and participation, and how their contributions can be taken into account prior to an event.

- The need to define future goals for a domestic response enterprise, particularly as it relates to the integration of new technologies and their associated effects. Although Camp participants highlighted several desirable functions and processes that they would like to see incorporated in such a system, room remains to define a long-term strategy for the transforming enterprise.

- The need to identify the relationships between system inputs and the effect of those relationships on the transformation of the response enterprise.

Recommendations

We recommend that the emergency management community focus on the following:

- **Baseline establishment:** Conduct a survey of domestic emergency management agencies to provide a baseline of social media and mobile technology capabilities (e.g., How many agencies in the United States are currently attempting to use social media tools, and of the ones that are, how are they using them?).

- **Messaging value:** Expand prior work on social influences on citizen preparedness and response behavior to include the effect of social networks when coupled with various messaging strategies. Presumably, the ability to "view" the behavior of others in a given social network will have an effect on citizen decision-making beyond that of messages delivered through traditional media. Concrete data on the extent to which this is true and can be measured stand to bolster the case for increased investment.

- **Operational benefits:** Demonstrate the value of integrating social media into operations by capturing improvements in the speed and effectiveness of response. Such a demonstration is critical to gaining buy-in. One area where these improvements can potentially be seen most clearly is in real-time disaster relief routing and logistics decision-making. Information gathered through social media platforms could help lead to the development of a set of meaningful metrics as well.

- **Exercises and real-world events:** Continue efforts to integrate social media tools and data into response exercises. These efforts are critical not only to understanding the value of social media, but also to creating a level of comfort in their use by emergency managers. In addition, efforts to capture the role of social media and the response ofVTCs through post-event analysis and after-action reports should be funded and formalized before an event occurs.

- **Reliability and usefulness:** Underlying the issue of social media's value are issues of data reliability and usefulness. Determine thresholds for data corruption and general reliability in response, as defined through post-event analysis, because they are essential to obtaining the buy-in of leadership at all levels of government.

- **Training and education:** Make the continued creation and refinement of training and knowledge-sharing opportunities for emergency management practitioners a priority. The 2011 SMEM Camp format was an experiment that was well received by the majority of participants.

I. Introduction

"[Social media] is starting to change the way we do business, and I think if we don't realize what's happening in emergency management then people are going to look up, and they're going to go,'What just happened?'"

– FEMA Deputy Administrator Richard Serino addressing attendees of the 2011 SMEM Camp[1]

Through the emergence of social media and related technologies over the past decade, individuals have experienced a fundamental shift in how they interact with the world, where they interact with it, and the speed at which interaction takes place. This particular combination of technology and community holds great promise for transforming many areas of society (e.g., journalism, education, political campaigns, and democratic movements). Recent crises, such as the 2010 earthquake in Haiti, have demonstrated the transformative effect of social media with respect to emergency management and the disaster response community. The likely impact of the combination of technology and community on the domestic response enterprise was the topic of discussion at the "SMEM Camp @ NEMA," also referred to as the 2011 Social Media in Emergency Management (SMEM) Camp (or the Camp), an event hosted jointly by the National Emergency Management Association (NEMA) Mid-Year Conference and the SMEM Initiative, in collaboration with CrisisCommons.

Over the past two years, individuals in the response community have paid much attention to the effect of new technologies—including social media—on international disaster response efforts; less attention has been paid to the effect of these technologies on domestic initiatives. On March 24, 2011, more than 150 members of the domestic response community, with various levels of technological expertise, convened for a day of learning and discussions on the value of social media and emergent technologies, on best practices, and on challenges relevant to the adoption and use of technology in emergency response. This marked the first time that representatives of such a wide cross section of the community met in person to discuss these issues and learn from one another. The broad range of attendees included representatives from the Federal Emergency Management Agency (FEMA Administrator W. Craig Fugate and Deputy Administrator Richard Serino), the American Red Cross, Twitter©, state and local emergency management agencies, private sector interests, and various volunteer technology communities (VTCs).[2] In the spirit of social media, topics for the event were "crowdsourced"[3] from the participants, and session titles included "Policy," "Getting Started (Social Media 101)," "Community-Building," "Situational Awareness," and "Running Your Shop."

Camp discussions revealed that, despite significant progress in the use and integration of social media and related technologies in emergency response, a gap remains between the way in which many advocates for social media adoption in the emergency management community would like to see these technologies used and the way in which they are currently being used. To date, these technologies have been used predominantly by public information officers (PIOs) to disseminate information to the public and to monitor streams of open source information. Although this use is valuable, Camp participants expressed a desire to see these technologies used consistently across all areas of the response enterprise (e.g. operations and planning) in an effort to leverage "open data"[4] and the participatory response community[5] in service of emergency management goals. The gap between the current state and the desired state of social media use persists in part because of considerable concerns and challenges that emergency managers face in creating external and internal buy-in, particularly at senior leadership levels.

The 2011 SMEM Camp had several associated objectives. One was to capture discussions from the event and develop a white paper that would highlight not only challenges of integrating new technologies into traditional U.S. response structures, but also examples of best practices and opportunities for future engagement and training. A related objective was to evaluate the Camp structure and environment as a vehicle for SMEM training and information-sharing in the future. This paper accomplishes these goals; it also places the day's discussions within a larger context of enterprise transformation theory, which is used to inform our understanding of how and why large systems change.

Enterprise transformation is the process of moving an entity from one state of existence to another, as defined by changes in the organization's inputs and processes [1]. Accordingly, theories of enterprise transformation are attempts to illuminate why large-scale systems change, what it means to change, when they should change, and how change occurs. We (the authors of this paper) take the view that the domestic response community is an example of such a system, consisting of numerous stakeholders, inputs, and processes that work together to save lives. This approach allows us to explore the impact of the identified challenges on the transformation of this system as familiarity and acceptance of social media in emergency response increases. Furthermore, taking a systems view of the *domestic response enterprise* both helps to improve our understanding of the transformation that is taking place and acknowledges the importance of the interactions between the system inputs.

Using enterprise transformation theory as a lens with which to view Camp discussions leads to the conclusion that the emergency management community[6] needs to conduct further work in several broad areas:

- Social media shine a spotlight on the community's need to redefine the domestic response enterprise (or system) in the context of FEMA's whole community initiative.[7] If we are to take seriously the notion that response starts with individual citizens and branches out to include institutions (established and emergent, nongovernmental, and governmental), then further work is needed to spell out exactly who these players are, what structures guide their interactions and participation, and how their contributions can be taken into account prior to an event.

- Further discussion must occur concerning the optimal structure for a domestic response enterprise. Specifically, the use of case studies, best practices, and available empirical work should make it possible to define an ideal structure. Although Camp participants highlighted several desirable functions and processes that they would like to see incorporated in such a system, room remains to define—with greater specificity—long-term goals for such a system.

- In attempting to define an ideal system, we have found that many of the challenges of achieving that system are inter-related. The community needs a better understanding of these relationships and the way in which they can affect the growth of the enterprise at all levels.

Paper structure

Section II—Background begins with an overview of the SMEM Initiative, the CrisisCommons community, and the relationship between the two. We provide a working definition of social media, as well as a description of some related technologies and initiatives that are important to the SMEM community. We finish by discussing reasons that emergency managers have taken an interest in social media and related technologies.

Section III—The 2011 SMEM Camp at NEMA details the origins and structure of the 2011 SMEM Camp and provides an overview of the data that were collected from the Camp.

Section IV—Transformation of the response enterprise addresses the notion that the U.S. response community is undergoing a period of transformation with respect to the influence of social media. In this section, we define the term *enterprise* and place it in the context of emergency response.

Section V—Inputs into the response enterprise follows up by underscoring six major themes from the Camp—(1) resources; (2) laws, policy, and guidance; (3) engagement and community-building; (4) buy-in and adoption through demonstrated value to others; (5) reliability and verification; and (6) structure and integration. These are cast as key inputs for the successful integration of social media into the response enterprise.

Section VI—Recommendations and final thoughts concludes the white paper by outlining pressing concerns for the community and areas for future exploration.

II. Background

History of SMEM and CrisisCommons

Arising from a desire among emergency management practitioners to discuss the rapid changes in emergency management caused by the widespread use of social media technologies, the SMEM Initiative was conceived in late 2010 to explore best practices and to build a bridge between social media and emergency management. Using Twitter as a tool to find and host discussions among individuals with shared interests, the community has evolved around the #smem hashtag[8] in an effort to

- Document and share social media best practices within the practitioner field of emergency management;
- Help frame policy development, operations, and other augmentations of support within domestic crisis management systems; and
- Accelerate the incorporation of, and engagement with, social media and accessible technologies within the broader emergency management community [2].

This effort is most pointedly evident during the weekly chat sessions that occur on Twitter between individuals in the SMEM community who use the #smemchat hashtag to comment on topics of particular interest, such as the use of social media for situational awareness and the role of leadership in agency-based implementations of social media.[9]

In practice, the SMEM Initiative seeks to build common understanding via "experience exchanges" that promote the inclusion of social media, public data, and technology innovation to support the objectives of emergency management [3]. In effect, the community is attempting to crowdsource solutions to many of the difficult challenges and questions that face the response enterprise during this period of transformation.

Since its inception, the SMEM Initiative has received support from the CrisisCommons community. In particular, the Camp was the result of a collaborative effort between the two entities.[10] CrisisCommons, a community of interest that "seeks to advance and support the use of open data and volunteer technology communities to catalyze innovation in crisis management and global development," has been in existence since 2009 [4]. Born of initial CrisisCamp[11] efforts in March 2009, CrisisCommons has coordinated remote volunteers around the globe to provide social media and related technology support for responses to events such as the earthquakes in Haiti (2010), Chile (2010), and Japan (2011), and to the floods in Nashville, Tennessee (2010), Pakistan (2010), and Thailand (2011). More than 3,000 volunteers in more than 30 cities across 10 countries have supported the community.

What are social media?

"Social media" are often defined simply by their associated tools. To this extent, the "Getting Started 101" session at the Camp provided an overview of several tools—including Twitter, Facebook©, Skype©, Ustream©, YouTube©, and other popular media—for novices. However, although defining social media via specific tools

is useful for explanatory purposes, a formal definition is critical in understanding its transformative effects and the appropriate manner in which the response community should, or could, adapt. For example, calling for increased investment in and the development of policy and guidelines for social media use in emergency management makes sense only if we know what social media are and how they are distinct from other technologies in which the community currently invests. Borrowing from several concepts, we define social media as the following:

Social media are technologies that enable mass collaboration and can be used to monitor, disseminate, and exchange information in ways that are both accessible and permanent.

The foundation of this definition—and the thread common to most other existing definitions of social media—is that a technology must enable mass collaboration in order to be considered a social medium. In fact, this characteristic alone is enough to distinguish social media from traditional media; the attributes and functions in this definition are requisite for the enablement of mass collaboration. In his book entitled *Cognitive Surplus*, Clay Shirky argues that the ability of individuals to make information both accessible and permanent is needed to seed collaboration on a large scale [5]. "Accessibility" requires that both the tool and the data that the tool produces (sometimes termed "user-generated content") are freely discoverable by large numbers of individuals. The permanence of this user-generated content, once accessible, is what makes social media useful for mass collaboration; it allows individuals to revisit, comment on, edit, and manipulate the data for a particular purpose over a sustained period of time in an asynchronous manner.[12]

Not only does the enablement of mass collaboration imply a certain set of attributes associated with the technology, but also a subset of functional capabilities is inherent in these technologies. The moderators of the "Getting Started 101" session articulated these capabilities when asked to "encompass social media along four dimensions." The moderators defined four stages of progression in the use of social media tools:

1. Use as an awareness or listening tool (e.g., monitoring various sites and pulling in relevant information and data)
2. Use as a one-way communications tool (e.g., pushing out content to individuals)
3. Use as a two-way communications tool to engage with the community, creating a dialogue by both sending and receiving information
4. Use as a tool to leverage the community as a resource in response efforts (e.g., mobilizing and achieving communal goals)[13]

The first three stages build toward the fourth, which is effectively mass collaboration. Exactly how emergency management agencies should progress along these stages was a common issue throughout the day of discussion.

Open data, mobile technologies, and geolocation

With the popularity of social media serving as the catalyst for the existence of the SMEM Initiative, discussion of social media tends to dominate the broader conversation within the community. However, the community is also interested in the effect of related technologies that do not quite reach the level of social media. These include various mobile technologies, such as smartphone applications,[14] geotargeted alert technologies, and Short Message Service (SMS) "text to donate" campaigns (see [6] and [7]). Although these do not meet the outlined definition of social media, they have been quite useful in the dissemination of preparedness and response information. As a result, the impact of these innovations has remained part of the community's discussions.

Furthermore, social media within the SMEM community often include the use of publicly available, or open, data for emergency management. The data that fall into the "user-generated content" category of open data are publicly accessible and, for the most part, were always meant to be public.[15] A second category of public

data includes data that were originally private and later made public. Over the past three years, there has been an influx of the second category of data into the public domain, spurred on by open data advocates such as Tim Berners-Lee [8]. Many state and local governments have also been leaders in the open data movement, allowing motivated citizens to use data in creative and difference-making ways in their communities.[16] In May 2009, the website www.data.gov was launched, aggregating data from many federal agencies in one place and making them openly accessible to anyone with an internet connection [9]. The initial success of VTCs in leveraging these types of datasets in support of response efforts has spurred the emergency response community to call for the continued release of datasets for public consumption (see [10] and [11]).

Understanding the interactions between new technologies, open data, and the evolving participatory response community is at the center of the work and meaning of social media in emergency management. Many individuals within the emergency response arena feel that we are in the midst of a transformative period because of the perceived value created through these interactions.

Why should emergency managers care?

"Short of motorized fire apparatuses, this technology is the best thing that's happened to our department in 122 years.…It holds more potential to save lives than any other civic tool" [12].

–Brian Humphries, Los Angeles Fire Department Public Information Officer

For emergency managers, the value of social media—the answer to the question, Why should I care?—lies in their ability to leverage social media technologies and the populations who use them to become more effective at saving lives. Toward this goal, Camp participants noted three predominant reasons that emergency managers should engage with social media:

1. Meeting and managing citizen expectations
2. Increasing situational awareness
3. Crowdsourcing and leveraging citizens as force multipliers

Meeting and managing citizen expectations

A recent study from the Pew Research Center concluded that in 2010, 42 percent of the U.S. adult population was using a social networking service (SNS), up from 27 percent in 2008 [13]. Included in this number are an estimated 155 million Facebook users in the United States, along with 24.4 million Twitter users [14]. In an attempt to better understand how this growing population of SNS users engage these services during emergencies, the American Red Cross conducted a survey in 2010 on "Social Media in Disasters and Emergencies" [15]. The survey of 1,058 respondents, aged 18 and older, uncovered several interesting statistics about citizen expectations of emergency response agencies. The survey found that

- 69 percent of respondents felt that emergency response organizations should regularly monitor their websites and social media sites so they can respond promptly to any requests for help posted there; and
- 49 percent of respondents thought that their request for help posted to the social media site of an emergency response organization meant that the organization was probably already acting on this request.

One concern expressed by Camp participants was that agencies, once they started using social media tools, would create expectations with regard to response and information-sharing that they would not be able to meet. However, the Red Cross survey revealed that the establishment of *any* online presence (e.g., a traditional website) creates expectations, irrespective of an agency's active engagement in social media.

To the extent that citizens have these expectations, there is significant value to be gained by an organization that establishes a social media presence and actively sets expectations of its response capabilities through active dialogue with its constituents.

Increasing situational awareness

The Red Cross survey mentioned earlier also found that there is a growing use of social media channels to post and find emergency-related information. Of those surveyed, 16 percent noted that they had used social media to get information about an emergency. Furthermore, half of the 72 percent who use a least one social media channel said that they would mention on their social media channels emergencies such as people needing assistance, flooded roads, downed power lines, potential crimes, car crashes, and major traffic jams. An example of this behavior in an international context can be found in the amount of Twitter traffic following the Japan earthquake in March 2011, just 13 days before the SMEM Camp. It was reported that comments posted to Twitter—also commonly referred to as "tweets"—from Tokyo were at one point coming at a rate of more than 1,200 tweets per minute [16]. These tweets contained information about missing persons, damage assessment, and immediate needs.

Response effectiveness stems from the quality of information available about the consequences of an event and the speed at which that information becomes available. Therefore, the ability to use social media tools to gather essential elements of information quickly and to develop a common operating picture with that information is a compelling case for adoption in a profession in which success is often tied to timeliness.

In addition, not only can these tools be used for the benefit of emergency managers, but also they are useful in providing instructions and situational awareness to individuals in a disaster environment. For example, one Camp participant noted that, as early as 2007, information posted on Twitter and Google© Maps provided California citizens with location-specific information during ongoing wildfires [17].

Crowdsourcing and leveraging citizens as force multipliers

Social media tools, if used properly, provide the opportunity to turn individuals whom emergency managers and first responders previously perceived as liabilities in response into critical assets. The ability to crowdsource and leverage both affected and unaffected persons as force multipliers in response—be it as information providers or aggregators—is what separates new media from old, and this is where the new value is created.

Mass collaboration in a targeted and quick way is strictly a function of social media. Camp attendees provided several examples of initial successes in using social media in this fashion. One notable example included Newark, New Jersey, Mayor Corey Booker's use of Twitter to aide citizens in the aftermath of a 2010 December blizzard, in which he actively responded to citizens' tweets requesting help [19]. Booker not only responded in person to many of the requests, but he actively tweeted throughout the event, imploring neighbors to help one another.

Since the Camp, there have been additional examples of integrating social media into response operations. Following the April 2011 tornadoes, the Alabama State Emergency Operations Center asked VTCs to assist in managing the large volume of information that they were seeing generated on Twitter related to post-tornado needs [20].

The difficult question is not, "Is there value in social media?" but, "In what situations is it most valuable?" How does one appropriately and effectively capture all the value that is possible? How does one demonstrate that value to others in the community who still do not believe in social media's usefulness and will not buy in? How does one effectively engage citizens and construct a dialogue and relationship that can be leveraged in response? How does one replicate the ad hoc response to these events and create a system—and a community of skilled volunteers—that is reliable? By what metrics do we evaluate social media's effectiveness for preparedness and response?

III. The 2011 SMEM Camp at NEMA

Following the 2010 International Association of Emergency Managers (IAEM) Conference, participants in an after-action discussion raised the idea of hosting a BarCamp©–style event.[17] The impetus for the idea was to train emergency managers and share best practices and concerns regarding the use of social media in emergency management. Planning for the event began in earnest in early December 2010, when NEMA agreed to co-host the SMEM Camp as part of its 2011 Mid-Year Conference. Weekly planning calls ensued in January 2011 and continued until the actual event occurred. Information from the calls, which was accompanied by the use of collaborative document platforms[18] such as Google Documents and PiratePad, was captured and posted on the CrisisCommons wiki.[19] This allowed the content to be shared with anyone interested in the initiative.[20]

A BarCamp format was chosen because of its flexibility and the opportunity it offered for both demonstration and dialogue. A key feature of BarCamps is that they allow attendees to determine the topics for discussion through a crowdsourcing process, as opposed to having an organizing committee dictate the topics. Inevitably, because of the process by which the topics are selected, the ones that are discussed that day are those that are most important to the majority of the people in attendance.

Figure 1. 2011 SMEM Camp participants placing breakout session ideas on the board

However, given that educating the audience about social media was expected to be one of the major outcomes of the Camp, several organizers were concerned that attendees would be hesitant to offer topic suggestions for the breakout sessions or to act as session leads. To address these concerns, the organizers identified several broad topic areas beforehand to stimulate attendee input on session topics and preselected moderators for each of the sessions.[21]

In accordance with the BarCamp structure, the organizers incorporated a significant degree of content-sharing into the event, along with several avenues for participation:

- Note takers in each breakout session who captured the day's discussions in documents that were later uploaded to Google Documents and made publicly accessible
- A live video feed of the conference plenary session provided through Ustream
- A conference hashtag (#smem11) provided on Twitter so that in-person attendees and virtual participants could engage with each other during the day's discussion in real time

A walk through the day

The day began with welcoming remarks from the FEMA Deputy Administrator, Richard Serino, and the lead organizers of the event, Heather Blanchard of CrisisCommons and Jeff Phillips, Emergency Management Coordinator from Los Ranchos de Albuquerque, New Mexico. All attendees were asked to briefly introduce themselves and describe three objectives for the day, using one word for each. Subsequently, participants were provided an overview of the BarCamp concept, given sticky notes with which to inscribe their topics of interest for the breakout sessions, and asked to place these on a large "selection board" that was broken up by the organizers' predefined categories (Figure 1). After the attendees had filled the board, a plenary session provided examples of best practice use of social media in emergency response. Meanwhile, a team of volunteers reviewed, aggregated, and coalesced the notes into a set of session topics, listed in Table 1. Participant-sourced topics for the 2011 SMEM CampTable 1.

The majority of the day consisted of the breakout sessions. After these sessions, participants were led back into the main room to share lessons learned and debrief on the day's events.

The Virtual Operations Support Group/Team

Notably, Jeff Phillips, Emergency Management Coordinator from Los Ranchos de Albuquerque, New Mexico, and one of the primary organizers, chose the SMEM Camp to debut a new concept that he had under development called the Virtual Operations Support Group/Team (VOSG/T). In his view, the VOSG/T is a way to integrate social media monitoring and engagement into existing concepts of operations (CONOPS) and business practices. In particular, VOSG/T is a structured way to leverage remote volunteers in support of emergency response operations by providing situational awareness to first responders and emergency managers. Phillips established a team of "trusted agents" to help him demonstrate a "proof of concept" at the conference in a no-fault environment. At the Camp, his team used a modified Incident Command Structure to help provide situational awareness and support to the virtual conference attendees, monitoring the Twitter stream, answering questions, and troubleshooting problems with the remote viewing and participation technologies. Phillips produced a "quick report" following the Camp, which outlines his intentions for the concept as a real-world response resource, and its use at the SMEM camp (see online appendix B and www.vosg.us). The implementation of this concept at the SMEM camp event helped engage the online participants in a novel way and maintained the spirit of BarCamp goals.

Table 1. Participant-sourced topics for the 2011 SMEM Camp

	Policy	Getting Started 101	Open Topic 1[22]	Community-building	Open Topic 2	Situational Awareness
Session 1	Policy Gaps	"I Don't Know" (Newbie Intro)	"Apps"	Adoption	"Running Your Shop" (Resources)	Monitoring
Session 2	Privacy	Basic Tools	Health	Technology Volunteers	PIOs v. Ops	Visualization
Session 3	Legal Framework	Best Practices	Cyber-Security	Engagement	Metrics	Validation

Data

The 2011 SMEM Camp was the first of its kind and presented an opportunity not only to capture issues, challenges, and best practices, but also to evaluate the Camp structure and its effectiveness as a vehicle for SMEM training and discussions. Given this opportunity (and with an eye on the development of this document), the organizers took care to capture as much camp-related data as possible.[23] These efforts occurred at three stages (pre-Camp, in-Camp, and post-Camp). They began with pre-Camp efforts that included

- Use of collaborative document tools to capture discussions from the pre-Camp planning calls, which were then archived on the CrisisCommons wiki; and
- Issuance of a pre-Camp survey to registered participants, asking them to articulate their expectations for the Camp, along with major areas of concern.

In-Camp collection efforts included

- Use of a research team to capture and record the day's discussion as it occurred in the plenary session and various breakout sessions; and

  Designation of a #smem11 hashtag on Twitter for conference conversation, allowing virtual participants to contribute to the discussion throughout the day. An online archive of tweets that contained the #smem11 hashtag was created, allowing tweets to be captured for post-event analysis.[24]

Post-Camp efforts included

- After-action evaluation and reporting, known as a "hotwash,"[25] for the event-organizing team via conference call to discuss the strengths and weaknesses of the event; and
- Issuance of a post-Camp survey to conference attendees, with the goal of capturing their thoughts on the execution and usefulness of the event.

The collected data provide the foundation for this report. Analysis of these data led to several observations about the camp structure and execution, along with observations about which issues are currently the most pressing for many within the emergency management community during this time of transformation.

IV. Transformation of the response enterprise

"Ultimately, our culture has to change as well. The Red Cross survey showed that nearly [70 percent] of individuals expect an official response to a social media post. There is a change in the culture. We can ignore it and depend on existing facilities, or lean forward into this."

– SMEM Camp Attendee

Throughout the Camp, participants repeatedly invoked the term *revolution* in describing the current period in which the emergency response community finds itself with respect to social media's influence on the practice of emergency management. The general consensus put forth by the Camp attendees that the community is undergoing a transformation left much of the day's discussion to deal with the issues that are driving this process. One conference organizer, Sara Estes Cohen, recalled that only three years ago she encountered resistance to her graduate thesis, which proposed a model for the use of social media to enhance university emergency communications [21]. It was her view that, within a year or two, opposition would diminish as individuals realized the value of social media tools. Significant factions of the response community, who have recognized that there is value to be captured and created from effective use of these tools, are now attempting to drive the transformation.

This section introduces the theory of enterprise transformation and uses this framework as a vehicle to set the stage for future work in characterizing the response enterprise—both as it is now and as the community would like it to look going forward. Furthermore, we introduce inputs that are characteristic of enterprises, in general, and provide a parallel to the challenges and issues that were highlighted at the Camp.

What is "enterprise transformation?"

We borrow from Rouse [1] to define enterprise transformation as the process of moving an entity from one state of existence to another through changes in the organization's inputs and processes. Accordingly, theories of enterprise transformation are attempts to illuminate why large-scale systems change, what it means to change, when they should change, and how change occurs. Although these theories tend to focus on private entities that are driven by CEOs who are able to make unilateral decisions that affect system-wide operations, many of the insights are directly transferable to a discussion of the process of change in large-scale, consensus-driven systems—such as the U.S. domestic response enterprise.[26]

In general, private and public enterprises face many of the same ongoing strategic challenges, which include

- Increasing impact;
- Enhancing relationships of processes to benefits and costs;
- Pursuing opportunities and avoiding diversions;

- Competing creatively while maintaining continuity;
- Investing in inherently unpredictable outcomes; and
- Carefully allocating the organization's scarcest resources [1].

How an entity adjusts to these challenges ultimately determines its core practices and functions. More pointedly, the strategic decisions made will ultimately determine the organization's value or effectiveness. In his text, *Enterprise Transformation: Understanding and Enabling Fundamental Change*, Rouse puts forth the following hypothesis for what drives enterprise transformation:

> Experienced or expected **value deficiencies** drive transformation initiatives. Deficiencies are defined relative to both current enterprise states and expected states. Expectations may be based on extrapolation of past enterprise states. They may also be based on perceived opportunities to pursue expanded markets, new constituencies, **technologies**, etc. [1].

In other words, value deficiency is defined by the difference, or gap, between the value of current system outputs and the hypothesized value of outputs that a transformed system is able to produce. The transformed system is defined through altered inputs or work processes (e.g., reduction of the labor force, an increase in competition, or the introduction of new technology). The extent to which an enterprise recognizes a deficiency and the way in which it decides to react to it will dictate its long-term relevance and stability. When an organization recognizes a value deficiency, it can choose from three options:

1. Do nothing
2. Engage in piecemeal transformation
3. Design and carry out a holistic strategy for transformation

If option 1 is selected, the organization runs the risk of dying out or, at the very least, becoming ineffective and losing relevance. Option 2, while preferable to option 1, is somewhat myopic from a strategic standpoint. Although attractive in that it limits the commitment of resources, option 2 is somewhat reactionary in nature and may fail to anticipate wider implications for the organization. Piecemeal changes may lead to suboptimal outcomes, since decisions that are optimal for a particular part of the system may be suboptimal—or even damaging—for the remainder of the system. For example, building a social media program on existing equipment and systems may be more convenient and cost-effective, but it may also result in unforeseen constraints that ultimately reduce the program's capacity, flexibility, resiliency, and utility. Hence, the more holistic approach of option 3, which identifies an ideal state for the system and attempts to anticipate system-wide effects of the altered environment (e.g., how changes in one area affect outcomes in another) is preferable. However, this type of engagement requires the greatest commitment of resources and the most extensive buy-in from leadership, and it is the most difficult to achieve.

The current value deficiency in the emergency response community stems from the introduction and wide-scale adoption of new technologies that, if leveraged in the appropriate way, could generate value via an increase in the desired output (i.e., more lives saved). Although the "Why should emergency managers care?" section highlighted some of the value already created through the use of these tools, there remains much more to be captured. Exactly how much more is an open question, one in which the SMEM community is actively engaged in trying to answer.

Figure 2. **A conceptualization of U.S. response enterprise stakeholders. Response starts at the local level and expands to include state and federal agencies as the size of the disaster increases. Individual citizens, private sector organizations, and nongovernmental organizations (NGOs) also contribute to the response efforts.**

What is the "response enterprise?"

The enterprise, as discussed thus far, is essentially a system, consisting of organizations, functions, and activities, that takes inputs (e.g., technology, people, laws, competitors) and produces outputs through various processes for a specific purpose. Examples of enterprises include

- The United Nations, which consists of member nations that work together to facilitate cooperation in international law, international security, economic development, social progress, human rights, and achievement of world peace;
- Universities, defined via colleges, departments, and faculty, which work to educate students and conduct research; and

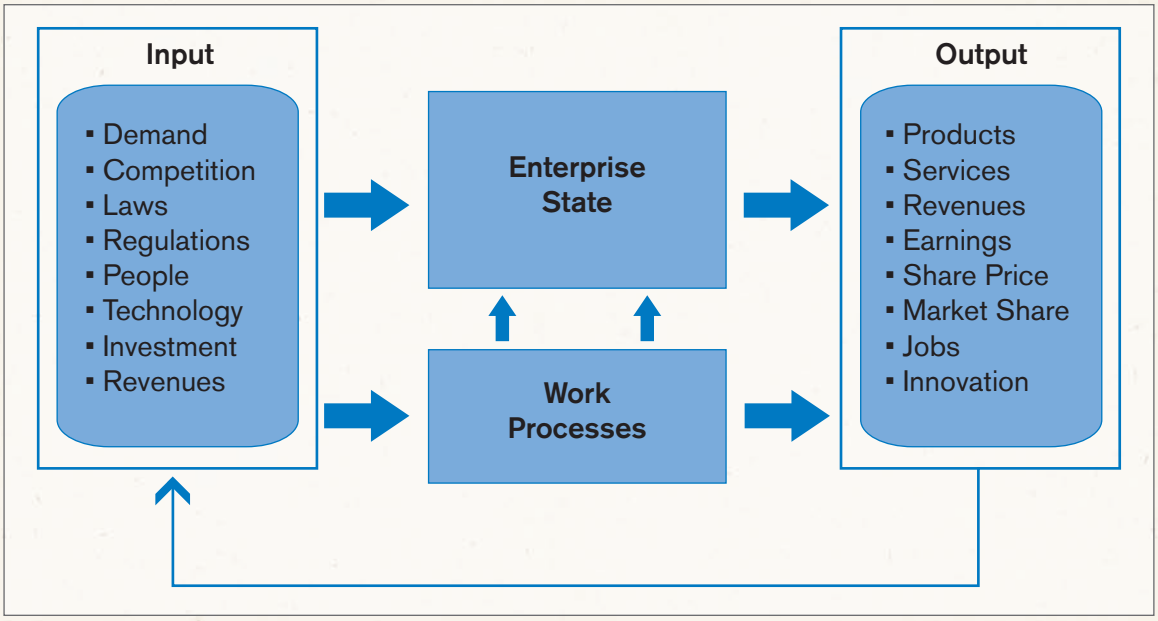
- Walmart, a retailer that runs a large chain of discount department stores and warehouses around the world and that must create profit for shareholders.

To accept that enterprise transformation theory is a useful framework with which to understand the reasons for change in the response arena and the critical factors in determining what that process ultimately yields, one must first accept that there is such a thing as a "domestic response enterprise." To this end, in his remarks opening the day's events, FEMA Deputy Administrator Serino asked the audience, "Who's on the team?" The question, though simple, helps illuminate the stakeholders, or actors within the response enterprise, much like FEMA's whole community initiative highlights outside entities in the belief that the response "team" includes more than just government organizations. In response to the Deputy Administrator's question, participants listed affected citizens, private sector entities, volunteers, neighbors, friends, nongovernmental organizations (NGOS), and faith-based organizations as team members, in addition to federal, state, and local government agencieFigure 2. A conceptualization of U.S. response enterprise stakeholders. Response starts at the local level and expands to include state and federal agencies as the size of the disaster increases. Individual citizens, private sector organizations, and nongovernmental organizations (NGOs) also contribute to the response efforts.e 2 provides a conceptual overview of the response enterprise, through incorporation of participating actors and some attendant notions of a hierarchical structure.

From a government perspective, the response enterprise begins at the local level and extends outward to state and federal agencies as the emergency overwhelms the ability of local emergency management organizations to respond. In parallel, the private sector, NGOs, and individual citizens integrate into the response effort, both informally and formally with respect to government efforts.

How these entities work together is governed by structures and guidelines defined at the national level, such as the National Incident Management System (NIMS) [22], the Incident Command System (ICS) [23], the Emergency Management Assistance Compact (EMAC) [24], and the National Response Framework (NRF) [25]. Although these are adequate in defining interactions among significant portions of the current system, they leave much to be desired in considering an expanded view of actors. As we begin to take seriously the contributions that individuals and entities outside government make in emergency response, it will be necessary to do

Figure 3. Elements of an enterprise system [1]



more to define a system that effectively integrates the efforts of these additional stakeholders, or what some in the emergency management community have termed the "participatory response community" [26].

As part of the effort to better define the domestic response enterprise and ultimately establish some concept of the ideal enterprise, considerable effort will need to be devoted to laying out inputs into the system and understanding how they interact in the formation of outputs. For example, one might consider the following question: How does demonstrated value of the system influence leadership buy-in? In his construction of the impact of inputs on a given enterprise and its associated outputs, Rouse posits several high-level inputs (Figure 3).

The outputs of any goal-oriented system or function are determined by the size and structure of its inputs. The domestic response enterprise is no different, as numerous inputs affect how well emergency management agencies are able to perform particular tasks. In turn, their ability to perform these response-oriented tasks ultimately determines how effective they are at saving lives.

Naturally, of the general inputs, some are applicable to the response enterprise, and some are not. Although further work would be needed to create a comprehensive list specific to the domestic response system and to determine the appropriate composition of these inputs, the Camp attendees provided some insight into what they perceive as the priority inputs and issues as they are attempting to navigate this transition. The process of crowdsourcing the conference topics allowed for an estimate of the inputs that are important to the system.[27] Reviewing the conference notes and associated data, we identified the following six topics as the most salient within the community:

1. Resources
2. Laws, policy, and guidance
3. Engagement and community-building
4. Buy-in and adoption through demonstrated value to others;
5. Reliability and verification
6. Structure and integration

These topics are certainly not all-inclusive, but they do provide an avenue to seed future research and discussion. The remainder of this paper explores these areas.

V. Inputs into the response enterprise

This section provides a deeper look at the inputs that are critical to a domestic response system, the related issues and challenges associated with these inputs and the integration of social media into traditional emergency management practices, and some best practice remedies discussed by Camp participants. Where appropriate, we note the relationships between inputs. However, it is our recommendation that additional research be conducted to provide a more comprehensive specification of response system inputs and their relationships.

Resources

Some of the most notable concerns at the Camp related to the level and type of resources needed to use social media within an organization. A discussion of resources, although potentially expansive, essentially boils down to a discussion of budgets. Available financial resources enable the procurement and development of resources, such as personnel, skills, and equipment. Participants were especially concerned because of the difficult financial position in which many state and local governments currently find themselves.

"In a time when we're facing budget shortfalls, the last thing I want to do is take on another task, determining new policies and procedures to get this up and running."

–SMEM Camp Attendee

Given the participants' range of experiences with social media, the conversation at the conference fell along two primary lines with respect to resources. Individuals who had relatively little experience using social media for emergency response purposes asked about the quantity and type of resources needed to effectively use these tools (e.g., How much time needs to be dedicated to monitoring a Twitter stream?). More experienced individuals were concerned that the limited resources that are available are not being used to achieve large-scale transformation goals, such as the integration of social media into response operations. The latter discussion is primarily one of buy-in and adoption, which we discuss later in this paper.

Resources dependent on purpose

Although an exact answer to the question, "How much is needed?" is hard to come by, many attendees pointed out that resource needs will largely be determined by (1) organizational goals and (2) context of use.

The earlier definition of social media introduced the concept of a functional progression in usage, ranging from monitoring various sites for relevant information to crowdsourcing and mobilizing citizens in a response setting. The level of resource commitment will increase in parallel with that progression.

Intent of use is important, but so is the context. An agency that uses social media only to monitor information provided during a crisis will need to commit fewer resources than an agency that decides to monitor social media channels in both steady state (day-to-day) and large-scale disaster situations. In addition, an agency that monitors social media channels only during a disaster will not require the sustained resource commitment required for steady state use. However, attempting to surge social media use during response with no training or community established through steady state use presents its own set of challenges.

Social media use in large-scale disasters or special events

Use of social media in a large-scale disaster response situation or for a special event has garnered most of the attention from the popular press outlets. Examples of use in special events include outreach by the Los

Angeles Police Department through Twitter prior to a major freeway closure in July 2011 [27] and monitoring by public information officers (PIOs) at the 2008 Democratic National Convention, as documented by disaster sociologist Jeannette Sutton [28].

Collection and dissemination of information via social media during a large-scale response are made difficult by the large volume of information that becomes available across the various channels. However, because the increased information flow is the by-product of a high-profile event, volunteers are often willing to help augment data collection and monitoring activities in support of response efforts. The emergence of these technical volunteers has led to the existence of VTCs like CrisisCommons, the Sahana Foundation, Ushahidi, Crisis Mappers, the Standby Task Force, Humanity Road, Geeks Without Bounds, and several others.[28] These groups arose from the beliefs that (1) there are a number of ways for response organizations to leverage new technologies to save lives, and (2) if the response organizations do not have the capacity or skills to create and fully use these tools when needed, then there should be individuals prepared to help fill that role.

Social media use in steady state (day-to-day)

Camp participants frequently highlighted the use of social media by the Los Angeles Fire Department (LAFD) as an example of effective integration of social media into the PIO role. However, the LAFD is also notable for the level of resources that they commit to monitoring activity and engaging with citizens through social media. Three LAFD PIOs provide support over a 24-hour period, engaging in information dissemination and discussion across their Twitter profiles, @LAFD and @LAFDtalk. On a steady state basis, they use the tools to monitor user-provided information and look for emergency reports and opportunities to provide clarifying information to citizens with questions and concerns [29].

For their paper entitled, "'Respectfully Yours in Safety and Service': Emergency Management & Social Media Evangelism," Mark Latonero and Irina Shklovski interviewed Brian Humphries, one of the LAFD PIOs and an innovator in using social media for emergency management, about his use of social media at the department [29]. Humphries notes that, because he is still responsible for all traditional duties and the department has not hired additional people to support his new duties, the use of these new technologies has significantly increased his workload. He states, "It's an inhuman – it's an inhuman workload sometimes, it['s] absolutely inhuman. I get 300 phone calls a day, on a busy day. It just goes, goes, goes ... We have not changed our staff" [29].

As another example of the level of resource commitment needed for steady-state operations, one of the Camp participants from the private sector discussed the work his company does to monitor public information streams, vet the information, and provide it to clients (if it reaches a particular level of importance). His company uses two analytic centers, where eight trained analysts work in tandem to determine the source and vet situational awareness information for various clients.

Although the private sector example presents an extreme steady-state resource load, it is Brian Humphries's reality that has made many individuals reluctant to engage with social media tools. However, individuals at the Camp noted that it does not require a large resource commitment to begin using social media within an organization. Participants suggested that those leery of committing resources to social media-related endeavors start at the most basic level of use by setting up an account on one of the various platforms to monitor social media activity occasionally. This initial foray would allow people to become familiar with the tools through observation without overcommitting themselves to sustained use. Coincidentally, this passive approach to use is consistent with the way in which a large segment of individuals with Twitter accounts use the platform [30]. This was the technique of at least one individual at the Camp who, "to avoid the feeling of drinking from a fire hose," checks his Twitter timeline periodically and does not worry about seeing all of the tweets in his timeline.[29]

Resource augmentation

Camp participants with experience in the use of social media provided suggestions for ways in which individual agencies could reduce potential burdens. The resources needed by a particular organization can be augmented either by using tools to streamline processes or by using outside groups to support operations.

Volunteer technology communities

Over the past few years, a new type of volunteer organization has emerged to support disaster response efforts. In contrast to traditional organizations that mobilize on-the-ground volunteers, VTCs exist to remotely support response efforts through the use of technology and open data [31]. These groups can be of significant help during response. Christine Thompson, a cofounder of Humanity Road, spoke about her organization's work in training 67 volunteers to support media monitoring for the United Nations humanitarian response to the Libyan civil war in 2011. FEMA has also recognized the value of these groups and has made an effort not only to work with existing organizations, but also to develop complementary efforts through its National Emergency Technology (NET) Guard pilot program (see [32] and [33]). Because these groups are made up largely of volunteers, they are best used to support specific tasks during large-scale response efforts in which there is a clear call to action.

The actual effect that these groups have had on on-the-ground outcomes is still somewhat unclear. Anecdotal reports of success have emerged, but until a better system of integration between these volunteer organizations and official response entities occurs, it will be difficult to capture and measure the impact of these organizations. The section entitled "Structure and Integration" explores this issue in greater detail.

Another way to augment personnel needs that participants discussed—but that is not known to have been implemented yet—was through a virtual emergency operations center (EOC).[30] The idea was that organizations could form mutual aid agreements, similar to those currently existing through EMAC,[31] whereby an EOC in a "sister city" could be activated to support virtual tasks associated with an emergency response in another city. This would free resources in the responding EOC by leveraging unused capacity elsewhere.

Tools

We have entered an era in which data are more abundant than ever, and their availability will continue to grow. Whereas data availability used to be the problem, the issue has become how to find the most relevant data in the sea of information in which the community is now submerged. A 2010 *Economist* article entitled "The Data Deluge" stated,

> According to one estimate, mankind created 150 exabytes (billion gigabytes) of data in 2005. This year, it will create 1,200 exabytes. Merely keeping up with this flood, and storing the bits that might be useful is difficult enough. Analysing it, to spot patterns and extract useful information, is harder still. [34]

"We struggle maintaining and looking at our Twitter feed, and other public information, when there is not an emergency. We'd like a single source to look at and populate our newsfeed."

– Scott O'Connor, Delaware Emergency Management Agency

As a consequence, many new tools have been developed to help manage, display, and filter the most relevant information for emergency responders. The moderators of the "Basic Tools" breakout session provided Camp participants with an overview of tools that they have found most useful in managing the additional work associated with their social media usage. These tools included Hootsuite©, TweetChat, and TweetGrid, all of which help manage streams of information across various social media accounts.[32]

Adam Sharp—a representative from Twitter, the platform most referenced by conference participants—talked about Twitter's desire to continue aiding government and being a valuable resource for emergency response. Although he noted that Twitter does not have the in-house capacity to develop specific products for

emergency management, they are committed to keeping the platform open and easily adaptable so that third-party developers can build customized tools on the platform.

To this end, Camp participants talked about how important it is for emergency managers and software developers to discuss what tools are both *necessary* and *practical*. Groups like Ushahidi, the Shana Foundation, and Random Hacks of Kindness have been instrumental in building platforms and products that help manage and collect the sizable amount of information that is created on a daily basis, as well as making it usable for response.

The chicken or the egg? Demonstrating value so you can demonstrate value

As the domestic response community is still within the early stages of transformation, skill and investment levels are generally low. Furthermore, the community finds itself in the classic paradox of having to demonstrate value with little or no investment, while believing that it could easily demonstrate value if given the appropriate level of support. It seems likely that the community would best be served by

- Leveraging available tools and volunteer organizations that have appeared early on to help offset the lack of internal resources in emergency management organizations;
- Engaging in training opportunities and reaching out to more experienced community actors, which will help to quickly surmount the initial learning curve and make individuals more productive in their use of the technologies; and
- Tailoring goals to the resources that are available, in recognition that even modest accomplishments early on can lay the foundation for increased investment in the future.

Laws, policy, and guidance

While a lack of resources poses challenges to the implementation of social media use in emergency response, a lack of clarity with regard to laws, policy, and guidance presents conceptual or procedural challenges to implementation. To a certain extent, the community finds itself in a "Wild West" situation, as the available technology has surpassed the rules and guidance that are currently in place. The resulting environment is particularly unsettling for individuals who are unfamiliar with this new space, causing them to opt out for the time being. However, even in the absence of clarity, it is imperative to use and experiment with the technology. Early adopters and champions of the technology will inevitably help to shape the tenor of laws, policies, and guidance.

Laws, policies, and guidance are natural steps in SMEM's evolution. The SMEM community is still uncovering issues associated with social media use and implementation that will ultimately require adjudication in the courts, such as liability, privacy, and copyright. Clarity, developed through this process of issue discovery and adjudication, will ultimately allow a previously hesitant population to become full participants in exploration and use of social media in emergency management.

Some might argue that new laws, regulations, and policies to address innovative practices can stifle progress if they are introduced too early or are too stringent. This may be true; however, it is also important to avoid the opposite extreme of across-the-board autonomy. Some level of actor autonomy is beneficial for many systems—even within the domestic response enterprise, certain levels of autonomy are necessary for response efforts at the local, state, and federal levels of government—but we must be cognizant that the response system depends on many different actors. Because of this, clarity in roles, behavior, and language has real benefits to response effectiveness.[33]

At the Camp, participants in sessions under the policy category identified major areas of concern related to policy gaps and legal issues. They also shared currently available guidance and best practice examples. Three major areas of concern surfaced, not only in the policy sessions, but also in almost all sessions:

1. Liability associated with using social media data as a basis for response decision-making
2. Privacy related to the use and release of collected information
3. Guidelines outlining who can use social media within the organization and what the appropriate process is for approving the release of information

Liability

Concerns around liability dominated much of the discussion throughout the policy sessions. Stressing the importance of resolving the legal issues related to social media use, one participant surmised, "Fear of lawsuits is the number one threat preventing adoption of social media during crisis." Participants articulated their fears in the form of several questions that they felt lacked sufficient answers:

- **Is there liability for *not* doing something?** Several participants were curious as to whether organizations could be held liable for not responding to requests made via a social media channel. For instance, if an individual or group of individuals requested help by sending tweets to a particular agency, could the agency be held accountable for not dispatching resources? Is there a certain level of social media traffic (e.g., 40 tweets about a particular incident) that should compel a response?

- **Are there consequences for decision-making based on nonauthoritative information?** In contrast to the previous question, individuals wanted to know if there was any risk (e.g., diverted resources, harm to responders or victims) in initiating a response based on information obtained solely through a social media channel.

- **Are there liabilities for citizens or organizations if they provide or spread incorrect information?** Inaccurate information could potentially divert critical resources from needed locations. Hence, it is logical to wonder if someone propagating false information, intentionally or not, might incur liability. Given the rise of VTCs and the potential reliance of emergency response agencies on information provided by them, can well-intentioned citizens be sure that they are protected from liability?[34] The same question arises for response organizations that provide information via social media channels.

- **What liabilities do the platforms create?** Twitter, Facebook, YouTube, and other social media platforms are entities within their own right, each with terms of service that govern their use. The liabilities that these terms of service create for organizations have been off-putting for many government agencies and serve as deterrents to the governmental use of social media.

The aforementioned concerns do not necessarily require new solutions or laws. Many of these concerns may be addressed by existing laws or by modifications or clarifications of current statutory language. For instance, it is illegal to provide false information when calling 911 in many states; this provision could be extended to include providing false information when sending a plea for help to an emergency management agency over Twitter or Facebook [35]. "Good Samaritan" laws, which are designed to legally protect citizens who provide help during a time of need,[35] could potentially be used to insulate individuals who participate in VTCs or act autonomously to spread emergency-related information in good faith during a time of response.

In their 2010 report, "Designing Social Media Policy for Government: Eight Essential Elements," Jana Hrdinova, Natalie Helbig, and Catherine Stollar Peters reviewed 26 publicly available government documents on social media [36]. They discovered that many of the guidelines related to legal issues use "generic text that requires all employees to adhere to all applicable laws and regulations without actually specifying which laws and regulations are applicable" [36]. In other cases, guidelines pointed to specific areas of law and the issues they addressed. Going forward, it should be the norm for all policy documents to point out explicitly where existing law does or does not address concerns or where there is a high level of ambiguity.

Many government entities have begun to work with several of the social media platforms to clarify their terms of use with regard to organization liability. In January 2011, the National Association of State Chief Information Officers (NASCIO) negotiated a terms-of-service modification with Facebook that removed specific language that NASCIO saw as hindering government agency use of this platform. Some participants at the Camp hoped that the emergency management community could do something similar.

Privacy

Initially, concerns about privacy may seem immaterial because so much of social media is widely available to the public. However, just as each platform must outline a privacy policy to govern how the service can use the data generated, agencies and individuals who collect data from these services for a specific use must make the same type of considerations. Gregory Wilshusen, Director of Information Technology at the Government Accountability Office, acknowledged as much during his July 2010 congressional testimony:

> Social networking sites, such as Facebook, encourage people to provide personal information that they intend to be used only for social purposes. Government agencies that participate in such sites may have access to this information and may need rules on how such information can be used. While such agencies cannot control what information may be captured by social networking sites, they can make determinations about what information they will collect and what to disclose. However, unless rules to guide their decisions are clear, agencies could handle information inconsistently [37].

Camp participants echoed Wilshusen's concerns regarding proper collection procedures and applicability of the Privacy Act of 1974. Some organizations proactively address these issues through the use of disclaimers when engaging with individuals on social media sites.[36] Some at the Camp believe that consent to identify and share an individual's information, as when an individual calls 911, is implied when a plea for help is issued via social media [38]. However, disclaimers and notions of implied consent can only extend so far and do not cover issues related to the collection and use of large sets of publicly generated records aggregated by third-party sites.

The U.S. Department of Homeland Security (DHS) Office of Operations Coordination and Planning (OPS) established its policy on the use of information collected from large-scale monitoring activities in the System of Records Notice published for launch of its "DHS/OPS—004 Publicly Available Social Media Monitoring and Situational Awareness Initiative System of Records" [39]. DHS/OPS stated that it would provide decision-makers with personally identifiable information (PII) collected by the system only in extreme circumstances:

> For example, in the event of an *in extremis* situation involving potential life and death, OPS will share certain PII with the responding authority in order for them to take the necessary actions to save a life, such as name and location of a person calling for help buried under rubble, or hiding in a hotel room when the hotel is under attack by terrorists [39].

The clarity around the aforementioned issues will dictate the speed of adoption across the response enterprise.

Guidance

Concern over liability leads to an associated question: Who exactly should be entrusted to use these tools, and in what ways should they be able to use them? These issues were of particular concern to Camp participants. The concern was not limited to professional use within an agency, but extended to personal use by individuals affiliated with an agency (e.g., Is it okay for a police officer to use a personal Twitter account to conduct agency business?). As seen not only in the domestic response enterprise, but also in a variety of institutions,[37] the open nature of social media creates tension within organizations that have traditionally been able to control all of their messaging.[38]

An example of this tension within the domestic response community can be found in the approval process for situational reports and press releases. These documents, when issued by a response agency, traditionally require several levels of approval. One participant stated that the issue of a press release in her agency requires six different signatures. However, at a time when unofficial information about an event can be generated and disseminated by nonagency actors in a matter of seconds, information in a press release can become outdated during the approval process. Pascal Schuback, Emergency Manager at the King County Office of Emergency Management, remarked that, during an event, his agency has stopped using situational reports and now issues short summaries every two hours through a persistent feed. Because of this changing dynamic, agencies will be forced to permit increasing levels of autonomy in issuing official information.

As it stands now, PIOs have the most social media privileges and responsibilities, as they are allowed to disseminate official information on behalf of their agencies. One key reason for this has to do with trust. In the absence of strict policies, the default position is to rely on individuals who have been entrusted with similar responsibilities in the past. Several PIOs at the Camp affirmed this current state, with one saying, "I'm the only one allowed to use social media for us. I'm an entrusted person for that. We haven't gone down the road of increasing access."

The concentration of social media use in the hands of the previously entrusted personnel offers a potential rule of thumb for determining policy and guidelines. Steve Radick, Lead Associate at Booz Allen who attended the Camp, remarked, "You can't replace good people with policies," and he cautioned against looking to detailed policy and guidance as the solution for increasing adoption and implementation of the use of social media. His advice was to "educate the right people, equip them with basic policy and structure, and empower them to use social media." This approach has led most organizations to limit use to the PIO position, having identified PIOs as "the right people." However, Radick was advocating for an expansion of the circle of trusted agents by seeking out and training additional individuals across the organization. To this end, several of the emergency managers in attendance felt that if basic policy and education were provided, it would not be necessary to limit use to certain individuals. As one participant asked, "How can we be trusted to save lives, but not trusted to tweet?"

Engagement and community-building

The value and existence of social networks require communities of individuals who are actively engaged in being social. The paradox of social media platforms is that although individuals use them because they find the content compelling, the content is provided only when individuals are actively using these platforms to publish, share, and exchange ideas. Furthermore, a person's level of engagement will largely dictate his or her experience on a platform.

"You can't surge trust." [40]

– Navy Social Media Handbook

Engagement and community-building were central to many discussions throughout the day, as much of the value in leveraging social media in emergency response is contingent upon investing effort in these two activities. Of the four stages of progression in the use of social media that were discussed earlier–(1) use as an awareness or listening tool, (2) a one-way communications tool, (3) a two-way communications tool to engage with the community, and (4) a tool to leverage the community as a resource in response efforts–building a community is necessary to all four stages, while engaging that community becomes critical at the second through fourth stages.

Use of social media as an awareness or listening tool requires knowledge of who is—and who should be—listened to. Even if an agency is not actively engaging with its community on a frequent basis, it must be aware of relevant individuals and groups. Meanwhile, use of social media to push out information raises the question, Who is the audience?

Using social media to reach into the community and cultivate individuals who are willing and able to help during an emergency response requires not only building an audience, but also

- Identifying individuals in the audience who can be trusted in a crisis;
- Establishing the organization as a trusted source; and
- Establishing expectations about what the organization can and cannot do as far as response.

To leverage the community for any purpose, it is essential to satisfy these requirements. In particular, trust and familiarity become a type of currency in response, helping to facilitate coordination and information-sharing between organizations and individuals (see [41] and [42]).

Numerous examples of the importance of community-building and engagement exist. In June 2011, *The New York Times* (also referred to as "*The Times*") appealed to its readership to help its staff read through approximately 24,000 emails of former Alaska Governor Sarah Palin [43]. *The Times*, wanting to experiment with the idea of crowdsourcing, quickly found itself rebuffed by its readership, with one individual saying, "Don't you folks get paid to do this work yourself?" and another saying, "I'd help out[,] but I need to get a root canal." *Fast Company* magazine, in assessing the failed appeal, pointed to a failure in community-building [44]. *The Times* had not created conditions beforehand that made people want to invest their time in helping the organization.

Alternatively, in a 2007 article entitled "Increasing Social Capital for Disaster Response through Social Networking Services (SNS) in Japanese Local Governments," Alexander Schellong offers an early example of how community-building via social media platforms can aid disaster response [45]. Drawing on the implications of James Coleman's seminal work, "Social Capital in the Creation of Human Capital," [46] Schellong argues that local SNS can help develop higher levels of trust and cohesion across a community. He then makes the case for SNS's value in dealing with disaster by linking the increased cohesion with the assumption that "communities and their underlying social networks matter in disaster and beyond," particularly as related to information-sharing [45].

A more successful example of community-building in the field of journalism occurred in June 2011, when National Public Radio reporter Andy Carvin appealed to his online network to help confirm the legitimacy of a Syrian blogger who went by the name "Gay Girl in Damascus" [47]. A post to the blog on June 6, 2011, by "her cousin" stating that "Gay Girl" had been abducted prompted Carvin and others to try to establish the identity of the blogger. Using his network of trusted sources, Carvin was able to obtain additional information, determine its authenticity, and ultimately uncover that the blogger was not a lesbian woman living in Damascus, but a 48-year-old man living in Scotland. Speaking at a conference after the incident, Carvin offered a central lesson learned from the endeavor:

> The lesson learned, if you're going to use Twitter as a source of open source news gathering, you can't wait until the story happens. You need to be on Twitter now, building up your credibility, building up sources of people that trust you as much as you trust them. So when things suddenly happen in a particular place, as was the case with me in Tunisia [*sic*], you're ready to ask people, and know who the right people are for the right questions and expand from there, and hopefully get the story right [48].

How is community-building done?

Camp participants offered several suggestions on how best to build a community and engage with community members on a sustained basis:

- **Establish a voice.** Clarity and consistency in message and interactions are important. Even when several people are using a generic agency account, individuals should feel that a *person* is behind the account, not that an agency is pushing out automated messages.

- **Be clear on the goals.** For a resource-limited organization, building and sustaining a community across several social media platforms can be challenging and time-consuming. If an organization cannot invest in building a community across these platforms—through either (1) giving one individual within the organization the time and resources to do so or (2) creating policies and guidance that would allow employees across the organization to do so in a distributed nature—then the organization's goals should reflect that. Specifically, the organization that is unwilling or unable to invest in community-building up front should recognize that it may not be ready for the third and fourth stages of use.

- **Build relationships and provide content to support the goals.** Within any social network, there is a segment of the population that an agency wants to see its messages and to be familiar with content when a crisis situation occurs, and vice versa. This targeted population varies according to the organization's goals. A local fire department may be concerned only with engaging its jurisdictional constituency and neighboring departments, while a VTC like Humanity Road is concerned with both cultivating geographically targeted relationships and helping to sustain a cadre of trained volunteers willing to provide virtual support from anywhere.

- **Be visible and responsive.** Social media channels provide an opportunity for agencies to shape public perception of their organizations during response. As one participant noted,

  > People now have the ability to see your response [beyond what is shown on television]… Occupying that public space immediately and being able to shape the public perception is in your favor as an organization. If you don't, other people will be putting information out there that may be false, or does not have your best interest at heart.

  Highlighted earlier, Newark, New Jersey Mayor Booker responded to requests for help during the 2010 December snowstorms in a very visible way through Twitter, and he was able to help shape perceptions of his crisis management ability and simultaneously foster a sense of communal support.

- **Be aware of blind spots.** Participants stressed the importance of being cognizant of biases; those who engage with response agencies via social media may be from a particular geographic or demographic population and not representative of the entire affected population. If agencies use their online community for planning or decision-making, they should attempt to develop a representative sampling of their community members or, at the very least, be aware of their blind spots. For example, Neil McDevitt, Program Director for the Community Emergency Preparedness Information Network, reminded participants to include individuals with disabilities or those who may speak different languages.

- **"Don't take the 'social' out of social media."** Steve Radick, from Booz Allen, stressed that organizations should remember that people want to engage with people, not marketing messages. The rules and guidance adopted by an organization should not undercut the social nature of the medium and the very reason that people are using social media. No matter what the message or goals are, most people will not stay engaged with a community that is not fun or interesting.

Buy-in and adoption through demonstrated value to others

The ability to demonstrate value (frequently in terms of a return on investment) often serves as a precondition for leadership buy-in and subsequent adoption and investment within organizations. In fact, after

hearing several real-world examples of benefits, some Camp attendees who had walked in as skeptics left ready to become champions for technology adoption within their organizations.

Value can be demonstrated in a qualitative manner through anecdotal stories and interviews, or through quantitative metrics that relate investment to improvements in outcomes (e.g., additional lives saved). Both are important. Although qualitative examples of value are easier to come by, quantitative metrics are critical for refining the investments and structures that make up an enterprise and underpin its transformation.

Value areas

Camp participants discussed several areas where value has been demonstrated thus far, primarily through anecdotal observation, and can potentially be expanded in the future. These included

- Preparedness messaging and warning;
- Situational awareness; and
- Force multiplication.

Other examples of social media's value during disaster response can be found in the areas of missing persons and fundraising (see [49] and [50]).

Preparedness Messaging and Warning

Information dissemination—one of the most basic uses of social media by an organization or individual—is extremely valuable. Social media can help to broadly and rapidly transmit numerous types of lifesaving messages, including information on evacuation routes, road closures, shelter locations, and ways to safeguard public health. In the 2009 Boulder, Colorado, fires, Sophia Liu—a Ph.D. student at the University of Colorado at Boulder—used Twitter to disseminate information and provide the affected population with situational awareness during the event. Her use was so effective that FEMA started pushing information directly to her [51].

Beyond information dissemination, social media offers a new way to influence preparedness and response behavior. The response community has long recognized the effect of social influences on individual behavior when it comes to emergency preparedness [52]. For example, Susan Cutter and Kent Barnes identified the effect of the actions of neighbors and friends on the decision to evacuate after the explosion at Three Mile Island [53]; Jasmin Reid and Fran Norris evaluated similar influences on risk perception in the face of hurricane threats [54]; and Dori Reissman and colleagues explored the effect of social influence on the success of public health interventions in the aftermath of a terrorist attack [55]. Social media create a new vehicle for individuals to view the thoughts and actions of their neighbors and friends, further compounding the importance of social influences. Hence, strategies that agencies put into place for communicating information to the public should attempt to leverage these social information effects for optimal gain with respect to influencing citizen preparedness behavior. To date, several preparedness campaigns have attempted to leverage social media tools for this purpose, including ones by the Centers for Disease Control and Prevention and DHS (see [56] and [57]).

Situational awareness

From an emergency management perspective, situational awareness within the first 72 hours of an event is critical to the success of response operations.[39] Moreover, experiences such as the Japan earthquake have shown that disaster-relevant information will be posted unprompted on social media channels. Consequently, the SMEM community has focused from the outset on extracting value from social media to provide decision-makers with real-time situational awareness. Patrice Cloutier, an emergency manger from Canada who attended the Camp, commented on the potential for mobile devices to impact situational awareness, stating, "You have millions of people with mobile devices, now coupled with the ability to geo-tag [i.e., to assign coordinates] and locate on a map where tweets are coming from. These are extra sensors, or nodes of data, which can help to broaden situational awareness."

The response to the earthquake in Haiti popularized the notion of social media and open source data—particularly when coupled with mapping utilities like Ushahidi—as valuable for situational awareness [58]. However, there have also been domestic examples. Camp participants pointed to the Boulder, Colorado, fires of 2009 as an example of an occasion on which fire engines were dispatched based on tweets because individuals were unable to get through to 911. Similarly, in the aftermath of a September 2010 explosion in San Bruno, California, FEMA Administrator Fugate used Twitter to determine the magnitude of the explosion from afar. He said, "I got better situational awareness [from Twitter] before we got official word. Four or five years ago[,] I wouldn't have gotten that quality of information" [59].

FEMA recognizes the value of this type of information. As part of the 2011 National Level Exercise Situational Awareness Workgroup, FEMA solicited input from the SMEM community to determine how social media and open source data can best be used by first responders.[40] Notably, the SMEM community pointed out that publicly available data sources could provide significant support for key reporting requirements (e.g., critical information requirements and essential elements of information). These requirements—such as establishment of disaster area boundaries and access points, and initial needs and data assessments—help decision-makers determine the appropriate response strategy [60].

Force multiplication

Beyond providing situational awareness, individuals both near to and far from the affected area can be specifically tasked to help with the response effort. This idea, aligned with the FEMA notion of whole community response, positions individuals to act as force multipliers[41] through the crowdsourcing of response-related tasks. Research on citizen event-reporting has shown that the use of "citizen sensors" (i.e., individuals who act as remote information providers) can lead to force multiplication in military operations, significantly reducing the number of soldiers needed for patrol and incident-reporting [61]. With respect to emergency response, crowdsourcing can potentially reduce to a significant degree the time that is needed to accomplish tasks such as post-disaster needs assessment and mapping of the affected area [62].

VTCs have had some initial success at leveraging groups of volunteers to perform small, response-oriented tasks. Through the process of crowdsourcing, they have begun to demonstrate that they can help reduce the amount of post-disaster work required of emergency response professionals. Their initial work has served as a model for what some in the emergency management community envision in the future as a national participatory crisis management system that routinely integrates citizens in disaster response.

Challenges

Exercises

Ideally, exercises would provide a controlled environment for exploring and evaluating social media benefits in emergency management. However, integration of social media into response exercises has proven to be difficult thus far.

The inability to fully mimic response system stressors found in disasters (e.g., information traffic demands, geographic distribution of inputs, content representation, information authenticity and verification) makes it difficult to argue that success in an exercise would necessarily translate into success in a real-world event. Hence, the use of exercises to establish value is somewhat diminished. However, with increasing numbers of exercises explicitly considering social media dimensions (e.g., Exercise 24 [63], National Level Exercise 2011 [64]), significant progress and refinements are being made. It is the hope of the SMEM community that as these refinements are made, the case for adoption will become stronger.

Metrics

Establishing a clear set of metrics remains the biggest hurdle to measuring and demonstrating value. Currently, the lack of measurements with respect to impact and reliability of social media in real-world events leave many unaware or unconvinced of their value.[42] Initiatives that will allow for increased data collection, as well as the assessment of technological tools and their use in response, will be critical to creating buy-in at

all levels of response. Initial research has begun in an effort to make the case, in a more rigorous way, for the usefulness of social media in detecting events in real time [65], locating missing or wanted persons [66], tracking disease [67], and predicting real-world outcomes [68]. However, much more work in these areas must be done to transform current thinking about where and how we get information. Such a transformation requires not only a reevaluation of what information is useful in this new technological environment, but also a resetting of beliefs with regard to people's perceptions of that information.

Reliability and verification

Unsurprisingly, much of the research that attempts to demonstrate value also grapples with the question of data reliability. As one participant wanted to know, "Can we trust it?" In other words, Is the information generated across social media channels reliable?

For many emergency management officials, the primary concern is the accuracy of the information that is propagated and amplified during response. For example, in the aftermath of the August 2011 earthquake in the Washington, D.C., area, Mike Madden, a reporter with *Washington City Paper*, re-tweeted to his followers the news that a building had collapsed on Pennsylvania Avenue, S.E., in the District of Columbia. One of his Twitter followers who was in the area saw no collapsed building and informed Madden, eventually leading Madden to apologize for passing along the information without verification.[43]

This incident exemplifies the legitimate concerns of many skeptics about information integrity. However, in the immediate aftermath of an event, the desire of decision-makers to obtain information rapidly, coupled with the limited situational awareness of responders in the impacted areas, has always led to concerns over misinformation. This was true before the advent of social media and remains true today. What concerns many officials now is the speed and scale at which misinformation can propagate. From an emergency management perspective, the following questions are especially relevant:

- How much misinformation can the system contain before it becomes unusable?
- How much misinformation is there in any given event?
- How can emergency managers verify and filter information as it comes to them during an event?

In the paper entitled "Investigating the Force Multiplier Effect of Citizen Event Reporting by Social Simulation," Mark Kramer, Roger Costello, and John Griffith were able to demonstrate an overall positive impact of citizen reporting on response, even with a certain number of individuals in the population acting as "foes" (i.e., individuals intentionally providing false information) [61]. However, the response community currently lacks rules of thumb for ascertaining which information should be used for decision-making. Camp participants provided several suggestions for increasing confidence in the information gathered from social media streams:

- Look for verification from multiple sources (i.e., data triangulation).
- Ask individuals for photos and video evidence to support claims, when possible.
- Look for information from individuals with a good reputation.

Many Camp attendees who had previously used social media data in response noted that they reacted to certain pieces of information only after seeing them mentioned by multiple sources. Some made it a rule of thumb to wait for a period of time after seeing the first mention of an event before reacting. Associated with this rule is a belief in self-correction. Given the visibility of the information to others, a feature inherent to

social media platforms, advocates believe the system would be self-correcting. In other words, if false information begins to circulate, at some point people will recognize that the data are false, and the declarations of the online community regarding the information's accuracy should eventually outweigh the initial claim.

For many in the emergency management community, a belief in self-correction is not enough. One participant recalled a conversation with a New York City Fire Department colleague who initially did not like the idea of relying on crowdsourced input. His colleague had stated, "You'll kill people; you can't trust the public." However, after viewing YouTube videos of fires that had been posted by citizen bystanders and provided valuable response perspectives, the colleague became convinced of the usefulness of citizen-provided information. The participant told this story about this colleague as part of a broader point that he was making–namely, that responders do not have to rely on what someone tells them, but can request that an individual making a claim show evidence of it. The ubiquitous presence of cameras on mobile phones allows responders to further verify claims by requesting or searching for photos and videos related to a specific claim.

These data verification practices become less important when information comes from a source with a reputation for providing accurate statements. As was discussed in the "Engagement and community–building" section, familiarity with individuals in a given network can help responders mitigate issues related to trust during response. The importance of reputation has been underlined through the research of Mark Kramer and colleagues and in efforts to develop software to sort and filter real-time information. According to their work, the implementation of a reputation system for citizen reporters could dramatically improve social media's impact on response activities (see [61] and [69]). Similarly, SwiftRiver, a Ushahidi platform to filter and verify real-time data, relies in part on a reputation system to help determine which information is credible.[44]

Maintaining credibility and reliability

Concern from emergency managers at the Camp extended not only to the credibility of the information that they receive, but also to the information that they provide during response. Given the speed of information dissemination versus the traditional requirements to report only verified information, many were concerned with how best to deal with the immediate desire for information from their constituents. One suggestion was that individuals set expectations, show engagement, and acknowledge the audience by posting statements such as the following: "We are aware of the situation, but do not have any concrete information to report at this time. As soon as we are able to provide accurate and confirmed reports, we will pass them along to you." This would help to keep constituents engaged and also guard against being a party to the spread of misinformation.

Post-event verification

Although a certain level of misinformation can be tolerated during response, one participant noted the importance of validation post-response. As response operations begin to take in larger and more diverse sets of data, it becomes even more important to understand the nature of the data being used and the data's effect on response outcomes. Consequently, authors of after-action reports should take care to review the datasets used during response and, ultimately, the data's reliability. Only through this type of analysis will the collection of real-time data and its use improve.

Structure and integration

The National Incident Management System (NIMS) provides a "comprehensive, nationwide systematic approach to incident management" in the belief that consistency in language, structure, and equipment are vital to successful incident response at all levels [22]. Key questions raised during the Camp with respect to social media and open data integration include the following:

- Can the response structure endorsed by NIMS readily incorporate new information and engagement streams, along with emergent technical volunteers?

- Where in this structure should responsibilities for these operations reside?
- What form(s) should these operations take?

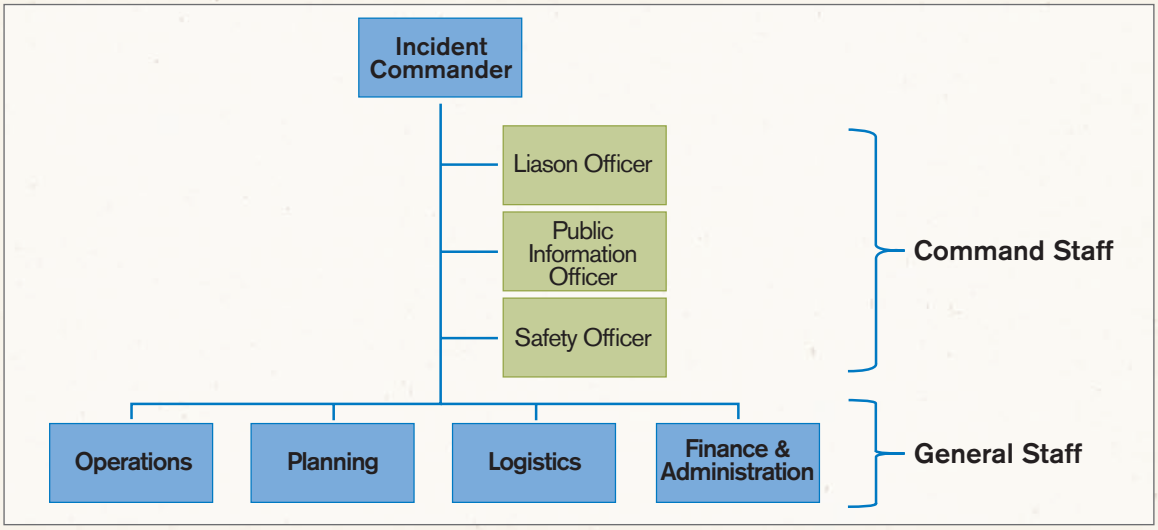
Under NIMS, the Incident Command System (ICS) serves as the organizational structure for on-scene incident management at all levels of response and for all hazards (Figure 4). There are five major ICS management functions: (1) command, (2) operations, (3) planning, (4) logistics, and (5) finance/administration. As needed, the Incident Commander may delegate authority for certain activities to either the Command Staff or the General Staff.[45] In addition, the federal government and many state governments organize their resources and capabilities under 15 Emergency Support Functions (ESFs).[46] The ESFs provide staff to support the incident command sections for operations, planning, logistics, and finance/administration, as requested, and multiple ESFs can be integrated into a single branch or group[47] to ensure effective coordination of services [25].

Many participants at the Camp posed the question, Are these structures adequate to handle new information and engagement streams, as well as the integration of emergent technical volunteers?

Camp discussion revealed that most organizations that use social media have placed responsibility in the hands of PIOs, the External Affairs ESF, or both. However, with respect to the current structure, the sentiment expressed was twofold:

1. Responsibility, particularly for data collection and analysis, should be expanded to include additional functional area stakeholders (e.g., the operations and planning section chiefs).
2. The current structure should be adapted to integrate the contributions of external volunteer groups and products.

Figure 4. Incident Command System (ICS) structure



ICS and social media

As noted in Figure 4, ICS structure covers five functional areas (i.e., command, operations, planning, logistics, and finance/administration). At the command level sit the Incident Commander, PIO,[48] Safety Officer, and Liaison Officer. Below that sit the various section chiefs, as identified earlier, and, at times, an Intelligence/Investigative Officer or Chief.

From Joint Information Center to Joint Information System

The open access to multiple social media channels can present significant difficulties when attempting to manage messaging during a high-profile, multi-jurisdictional response effort. A participant from Michigan recounted her experience with online messaging during a major in-state oil spill, stating that the event generated "three to four different hashtags," primarily driven by media outlets, in addition to the one the state had established. Consequently, her agency had to spend time directing individuals toward the state hashtag for official information. While there was a Joint Information Center, the event underscored the need for the incorporation of social media considerations into a Joint Information System.

Camp participants offered the following breakdown of social media responsibilities based on current roles within the ICS structure:

1. PIO – Information dissemination
2. Operations – Use of information to organize tactical operations
3. Planning – Collection and assembly of incident-relevant information for use by the operations section
4. Intelligence – Information screening

However, no one took the position that there was only one "right way" to organize internally. But most discussion participants did agree that it is important to establish some internal protocols specific to each organization's needs. Furthermore, internal trust is essential with respect to information-sharing.

Shayne Adamski, Senior Manager from FEMA's Digital Engagement Office of External Affairs, offered his view on how FEMA has begun to link the value propositions to where responsibilities and tasks reside within its internal organizational structure. He stated,

> One of my roles is doing this internally and talking through the value propositions. For the situational awareness piece, it lives in External Affairs and the Operations Center. For data, I don't think it's all about one group, and we're helping to identify the importance of tech volunteers getting together.

A national participatory response system

To date, there have been several cases of successful integration between VTC efforts and disaster response organizations, both internationally and domestically. During the Haiti earthquake response, official response organizations took to relying on volunteer-generated maps and data streams because official sources were either outdated or non-existent [70].

Patrice Cloutier highlighted a partnership in Ontario, Canada, between CrisisCommons and his emergency management agency:[49]

> In Ontario, we recently expected a major snowstorm. The people at CrisisCommons were going to do a snow map of impacts on the Toronto metropolitan area, where we linked from the [emergency management agency] to [its] website. Initial results were positive, and led us to bring some key people into our EOC to begin formalizing this relationship, where they can feed in data and talk to our [Geographic Information Systems] and [Operations] people. Getting people in the same room and saying this is what we do.

However, instances of successful integration between the VTCs and response organizations have remained scarce. Even for the Haiti earthquake, questions have been raised as to the actual impact of the VTCs, given a lack of interface with some of the responding organizations [71]. Without an established integration channel,

there is a risk that the efforts of technology volunteers and organizations will be in vain. Consequently, many of the participants questioned how best to integrate the contributions of the VTCs with those of traditional response organizations and shift toward a participatory response paradigm.

CrisisCommons, in response to questions from Congress on VTC integration, proposed a national participatory response system that formally integrates the role of technologists and VTCs in response. They stressed the need for an *a priori* understanding of how integration will occur. Specifically, they proposed the creation of a data operations center, external to an EOC, which could absorb technology volunteers and provide mapping, data aggregation, and monitoring support via a VTC liaison staffed at the EOC.[50]

Moving forward, additional work is necessary to establish the integration mechanism and to deal with questions and concerns—many of which have been mentioned in previous sections—that arise during implementation. Although these questions have yet to be fully addressed, defining internal structures and integration mechanisms for external stakeholders will help in the transformation process to capture the potential value. The extent to which VTCs begin to solidify organizational identity and formally align with the national response structure will determine their future role in disaster response.

Global Perspectives: Canada

The 2011 SMEM Camp and this paper contextualize and explore the impact of social media and VTCs on the U.S. emergency response system. However, the use of social media in emergency management is not just a U.S. phenomenon. Countries across the globe are dealing with many of the same issues that were uncovered at the SMEM Camp. In a short paper written after the event, Patrice Cloutier offered a Canadian perspective on the challenges to integrating social media into emergency management). Cloutier writes:

> In many of the key agencies and organizations involved in emergency management in Canada, there is still significant reluctance to truly embrace the power of social media. Key among the perceived threats are the lack of data validation, uncertainty about volunteer training, the absence of standards among the volunteer technical community[,] and the hesitation to engage in conversations on social media platforms.

Cloutier also cites issues of security and a general unwillingness to trust public servants with access to social media platforms at work as additional barriers to effective use and integration.

Despite these challenges, Cloutier points out several examples of recent progress in Canada, including

- Emergency Management Ontario's use of Twitter and Facebook as part of the Ontario Public Warning System and its partnership with CrisisCommons Toronto to support a crowdsourced map in anticipation of a 2011 winter blizzard;
- Live streaming of flooded rivers during the spring of 2011 by the Manitoba government; and
- The development of guidelines, in 2010, by British Columbia on the use of social media by government employees.

Cloutier is encouraged by the initial efforts of Canada's VTCs (calling Canada "a hotbed for the crisis mapping phenomenon and a crowdsourcing nexus") and by the growing number of emergency managers who believe in the importance of social media as a tool for emergency response going forward. He concludes by stating, "Canada is one of the most 'connected' countries in the world. Its population is generally tech savvy and Canadians are early adopters of new technologies. Given these facts, the future points to an increased integration of social media in emergency management programs throughout the country."

VI. Recommendations and final thoughts

Throughout this document, we have attempted to offer recommendations for additional areas of exploration. In the following, we highlight several of those areas and make additional recommendations for future training and knowledge-sharing events.

- **Baseline establishment:** A survey of domestic emergency management agencies, similar to the SAFECOM 2006 National Interoperability Baseline Survey, should be conducted to provide a baseline of social media and mobile technology capabilities (e.g., How many agencies in the United States are currently attempting to use social media tools, and of the ones that are, how are they using them?) [72].

- **Messaging value:** Prior work on social influences on citizen preparedness and response behavior should be expanded to include the effect of social networks when coupled with various messaging strategies. Presumably, the ability to "view" the behavior of others in a given social network will have an effect on citizen decision-making beyond that of messages delivered through traditional media. The extent to which this is true and can be measured stands to bolster the case for increased investment in social media messaging strategies and resources at the state and local levels of emergency response.

- **Operational benefits:** The value of integrating social media into operations should be demonstrated by capturing improvements in the speed and effectiveness of response. Such a demonstration is critical to gaining buy-in. One area where these improvements can potentially be seen most clearly is in disaster relief routing and logistics decision-making. Information gathered through social media platforms could result in improved response efforts [73]. Using information gathered through social media platforms in this way can help lead to the development of a set of meaningful metrics as well.

- **Exercises and real-world events:** Efforts to integrate social media tools and data into response exercises should be continued, as they are critical to understanding the value of social media and to creating a level of comfort in their use by emergency managers. In addition, efforts to capture the role of social media and the response of VTCs through post-event analysis and after-action reports should be funded and formalized before an event occurs.

- **Reliability and usefulness:** Underlying the issue of social media value are issues of data reliability and usefulness. Thresholds for data corruption and general reliability in response, as defined through post-event analysis, should be determined, as data accuracy is essential to obtaining the buy-in of leadership at all levels of government.

- **Defining the response enterprise:** Additional study of the domestic response enterprise—including framework expansion, conceptualization of inputs and processes, and mapping of interactions between inputs—will be useful in uncovering ways to best capture potential value throughout the transformation process.

- **Training and education:** The continued creation and refinement of the training and knowledge-sharing opportunities for emergency management practitioners should be a priority. The 2011 SMEM Camp format was an experiment that was well received by the majority of participants.

The case for continued use and full integration of social media tools and technical volunteers into the emergency response system can be strengthened only through work that uncovers and provides ways to capture the added value of these entities. Current research efforts—such as Project EPIC,[51] initiatives through the DHS Science and Technology Directorate [74], and the San Diego State University Visualization Center—are actively exploring several of the issues that have been discussed. However, to accelerate the process of adoption and knowledge acquisition, more funding and attention should be dedicated. The areas highlighted in this paper are only a small subset of the research needed.

Final thoughts—why now?

There are certain times when transformation is forced upon an organization or enterprise by events outside its control. There are times when the market or cultural environment within which an enterprise operates dictates that transformation must occur by creating value deficiencies relative to the current state of the enterprise. At that point, an organization can choose to (1) stand still and do nothing, (2) engage in a myopic strategy of addressing individual issues and challenges as they surface, or (3) engage in a holistic strategy of transformation that considers the impact of the new dynamics on all inputs and the subsequent adjustment required.

A cultural shift in expectations has already occurred with respect to social media and emergency response. Members of the SMEM Initiative have elected to confront head-on the implications for their profession and to consider ways to best adapt. The 2011 SMEM Camp is an example of this approach. Simply put, doing nothing in the face of this altered environment is to risk losing relevance. As FEMA Deputy Administrator Serino warned, a failure to take action may soon result in having to ask ourselves, "What just happened?"

Appendix A: Acronyms

CONOPS	concepts of operations
DHS	Department of Homeland Security
EMAC	Emergency Management Assistance Compact
EMO	Emergency Management Ontario
EOC	emergency operations center
ESF	Emergency Support Function
FEMA	Federal Emergency Management Agency
IAEM	International Association of Emergency Managers
ICS	Incident Command System
LAFD	Los Angeles Fire Department
NASCIO	National Association of State Chief Information Officers
NEMA	National Emergency Management Association
NET Guard	National Emergency Technology Guard
NGO	nongovernmental organization
NIMS	National Incident Management System
NRF	National Response Framework
OPS	Office of Operations Coordination and Planning
PII	personally identifiable information
PIO	Public Information Officer
SMEM	Social Media in Emergency Management
SMS	Short Message Service
SNS	social networking service
VOSG/T	Virtual Operations Support Group/Team
VTC	volunteer technology community

Online Appendixes

Appendix B: The Virtual Operations Support Group/Team

Jeff Phillips. "Quick Report-VOSG/T Concept March 24, 2011," at http://scr.bi/VOSGTConcept.

Appendix C: Global Perspectives: Canada

Patrice Cloutier. "Integrating Social Media into Emergency Management: The Canadian Experience," at http://scr.bi/SMEMCanada.

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End notes

01. Unless otherwise stated, all quotations within the document come directly from the notes taken at the Camp by volunteer participants. Notes from the Camp can be found on the CrisisCommons wiki website at http://wiki.crisiscommons.org/wiki/SMEM_Camp_at_NEMA.

02. Volunteer technology communities that participated in the Camp included CrisisCommons (www.crisiscommons.org) and Humanity Road (www.humanityroad.org). These communities, and others like them, support emergency response efforts through the use of technology and open data.

03. A combination of the words *crowd* and *outsourced*, the word *crowdsourced* refers to the act of outsourcing a particular task (e.g., data collection) to a large group of individuals ("the crowd"), usually through an on-line medium.

04. Discussed more explicitly later in the paper, open data are data made available for unrestricted use and dissemination by the public. More specifically, data are considered "open" when there are no proprietary restrictions, such as copyrights or patents, placed on its use.

05. The term *participatory response community* refers to the collective of individuals and groups who take an active role in disaster response through tasks such as data collection and crisis mapping, although they are not formally aligned with a federal, state, or local emergency response organization.

06. The term *emergency management community* is meant to include not only emergency managers, but also individuals whose work or study is either influenced by or influences the practice of emergency management. Throughout, this term will be used interchangeably with the terms *response community* and *domestic response community*.

07. The whole community initiative is a reorientation of the thinking behind emergency response and a recognition that many entities outside government agencies play an integral role in response operations. This initiative is explicitly addressed in the FEMA Strategic Plan for fiscal years 2011–2014 (http://www.fema.gov/about/2011_14_strategic_plan_faq.shtm#2).

08. The "#" symbol, called a hashtag, marks key words or topics in a tweet—a text-based post made through the Twitter platform. Twitter users created it as a way to categorize messages (http://support.twitter.com/entries/49309-what-are-hashtags-symbols). The hashtag designation used by the SMEM community for community-related posts is #smem.

09. Archived chats and more details about the weekly chats can be found at http://www.sm4em.org/smemchat/.

10. The SMEM Camp at the NEMA conference was the first time that many of the most active participants in the community met in person.

11. As defined on the CrisisCommons website (http://crisiscommons.org/about/), CrisisCamps are events that "connect crisis management and global development practitioners to the technology volunteer community." These events provide technically inclined volunteers to use their skill sets in the assistance of affected communities during a time of crisis.

12. Others have supported this view, including Anthony Bradley, a vice president at Gartner Research, who, in a blog post entitled "A New Definition of Social Media" (http://blogs.gartner.com/anthony_bradley/2010/01/07/a-new-definition-of-social-media/), outlines a set of six principles that "help define what it means to enable mass collaboration." Akin to Shirky's delineation of "accessibility" and "permanence," two of Bradley's six principles—"transparency" and "persistence"—appear as core principles.

13. Mobilization in support of response is specific to the emergency management community. However, the larger point of being able to mobilize large groups of individuals for an expressed purpose still stands. A corollary to this level of engagement is crowdsourcing.

14. Examples of these types of applications include the shelter locator application from the American Red Cross (http://redcrosschat.org/2011/02/22/theres-an-app-for-that-shelter-view/), the Community Emergency Response Team Guide (http://itunes.apple.com/us/app/community-emergency-response/id371216321?mt=8), and many others generated by organizations such as Random Hacks of Kindness (http://www.rhok.org/solutions).

15. We use the term *publicly accessible* with the understanding that individuals can often restrict who can view their content by altering privacy controls provided by most social media platforms. In this sense, the term is somewhat limited, but we use it to highlight that the majority of individuals who use social media intend to share their content with *some* audiences in an unrestricted way.

16. Berners-Lee provides examples of such uses in his 2009 TED talk, entitled "The Year Open Data Went Worldwide" (http://www.ted.com/talks/tim_berners_lee_the_year_open_data_went_worldwide.html). Other examples of leveraging open data for problem-solving within cities can be found through the work of Code for America at their website http://codeforamerica.org/ (see also http://www.nytimes.com/2009/12/07/technology/internet/07cities.html).

17. BarCamps are participatory workshop events in which content is crowdsourced from participants at the event. BarCamps consist of sessions proposed and scheduled each day by attendees, mostly onsite, typically using whiteboards or paper taped to the wall. Attendees are encouraged to present or facilitate a session. Everyone is also asked to share information and experiences about the event via social media channels. Further information about typical rules can be found at the BarCamp website via http://barcamp.org/w/page/405173/TheRulesOfBarCamp.

18. Collaborative document platforms are internet-based environments that allow multiple authors to contribute to a document simultaneously.

19. A "wiki" is a collaborative website that uses a simple markup language to allow community members to create and publish content to the site. CrisisCommons allows users to organize and archive community projects and initiatives under various web pages on their wiki. Perhaps the best known wiki is Wikipedia (www.wikipedia.org), an online crowdsourced encyclopedia.

20. The notes from the planning calls can be found at http://wiki.crisiscommons.org/wiki/SMEM_Initiative#Notes.

21. The initial pre-Camp agenda can be found at *http://wiki.crisiscommons.org/wiki/SMEM_Camp_Agenda*. Although a deviation from the traditional format, the ability of the participants to define the content of the Camp was in no way hampered by this agenda. In fact, the "Return on Investment" topic area, which organizers thought would be of high interest, did not receive enough interest from the participants to merit a stand-alone session.

22. Although the topics for this section were sourced from attendees, there was no participation in any of the associated sessions.

23. The majority of this information can be found under the SMEM Initiative section on the CrisisCommons wiki at http://wiki.crisiscommons.org/wiki/SMEM_Initiative.

24. An archive of tweets containing the #smem11 hashtag can be found at http://twapperkeeper.com/hashtag/smem11.

25. A "hotwash" is a post-event discussion between stakeholders to highlight areas of weakness and strength with respect to event execution. The ultimate purpose is to develop ways to improve upon the just completed event for similar events in the future.

26. We should note here that although unilateral decisions are made every day as to how individual response organizations will accomplish their goals, consensus and collective action are needed to make substantive changes at the enterprise level.

27. It should be noted that the crowdsourcing process is wholly dependent on the preferences and views of the individuals who participate and may not necessarily reflect the preferences and views of the community at large.

28. We use the term *volunteer technology community (VTC)* here in a broad way to group organizations working to provide what is generally recognized as nontraditional emergency and disaster response support through the use and development of new technologies. Significant distinctions exist between individual organizations grouped under this term, and we make no claim of uniformity with regard to structure, goals, or other organizational components. Similarly used terms include *digital volunteer communities* and *volunteer and technical communities (V&TCs)*.

29. A Twitter "timeline" is an aggregated stream of tweets, or posts, to the Twitter platform from the collective of users. Individual user timelines are unique and vary, depending on those from whom the user chooses to receive posts.

30. In their response to congressional questions for the record, CrisisCommons provides a more detailed explanation of the concept behind a virtual emergency operations center (http://crisiscommons.org/2011/07/07/congress_qfr/).

31. Ratified by Congress in 1996, the Emergency Management Assistance Compact establishes a firm legal foundation through which states can share and request resources from one another during disaster relief efforts.

32. The respective tools can be viewed at their websites: http://hootsuite.com/, http://tweetchat.com/, and http://tweetgrid.com/.

33. The National Incident Management System is built around this notion, as it "provides a systematic, proactive approach to guide departments and agencies at all levels of government, nongovernmental organizations, and the private sector to work seamlessly to prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity, in order to reduce the loss of life and property and harm to the environment" (http://www.fema.gov/emergency/nims/AboutNIMS.shtm).

34. Ed Robson, Esq. expounds on several liability issues in his article, "Potential Liability for Crowdsourced Disaster Response Groups" (http://stipcommunia.wordpress.com/2011/09/26/potential-liability-for-crowdsourced-disaster-response-groups/).

35. An example of this is Hawaii's Good Samaritan Act, which states in part, "Any person who in good faith renders emergency care, without remuneration or expectation of remuneration...shall not be liable for any civil damages resulting from the person's acts or omissions, except for such damages as may result from the person's gross negligence or wanton acts or omissions" (Hawaii Revised Statutes §663-1.5 [a]).

36. In the Center for Technology in Government report entitled "Designing Social Media for Government Policy: Eight Essential Elements," the authors cite an example used by employees from the state of North Carolina (page 11): "Posts and comments to and from me, in connection with the transaction of public business, is subject to the North Carolina Public Records Law and may be disclosed to third parties."

37. For example, the National Football League has had to define policies to limit player use of social media (http://mashable.com/2009/08/31/nfl-social-media-policy/).

38. Joanna Colvin, Vice President of Social Media at Citigroup, provided an example of her company's internal corporate practices with regard to employee use of social media technology. For employees around the world, Citigroup maintains an internal best practices site that contains legal, registration, compliance, and standards documents. They have found this to work well in helping provide consistency across the organization.

39. This 72-hour marker is acknowledged widely across FEMA doctrine, including the strategic plan for fiscal years 2011–2014. An overview can be seen at http://www.fema.gov/about/2011_14_strategic_plan_overview.shtm.

40. Information on the CrisisCommons and SMEM contributions can be found on the CrisisCommons wiki at http://wiki.crisiscommons.org/wiki/Situational_Workgroup.

41. Force multiplication refers to an intervention, such as enhanced technological capability, that makes a given force (or collection of resources) more effective than it would be without that intervention. The expected personnel size increase required to have the same effectiveness without the advantage of the inter-vention is the multiplication factor.

42. As mentioned earlier, the lack of participant interest in a proposed "Return on Investment" session is perhaps indicative of the difficult challenges in this area that many have not yet begun to tackle.

43. Madden's apology can be seen at http://twitter.com/#!/mikemadden/status/106076218314600448.

44. The SwiftRiver platform guide (http://knight-content.communicationsmgr.com/pcsupload/ 5972dc56-a1ab-404f-921e-c243e655367d.pdf) provides a background of its algorithm.

45. The Emergency Management Institute course, IS-100.b–Introduction to Incident Command System, provides an introductory overview (http://training.fema.gov/emiweb/is/is100b.asp).

46. The 15 Emergency Support Functions (ESFs) are (1) Transportation; (2) Communications; (3) Public Works and Engineering; (4) Firefighting; (5) Emergency Management; (6) Mass Care, Emergency Assis-tance, Housing, and Human Services; (7) Logistics Management and Resource Support; (8) Public Health and Medical Services; (9) Search and Rescue; (10) Oil and Hazardous Materials Response; (11) Agriculture and Natural Resources; (12) Energy; (13) Public Safety and Security; (14) Long-Term Com-munity Recovery; and (15) External Affairs.

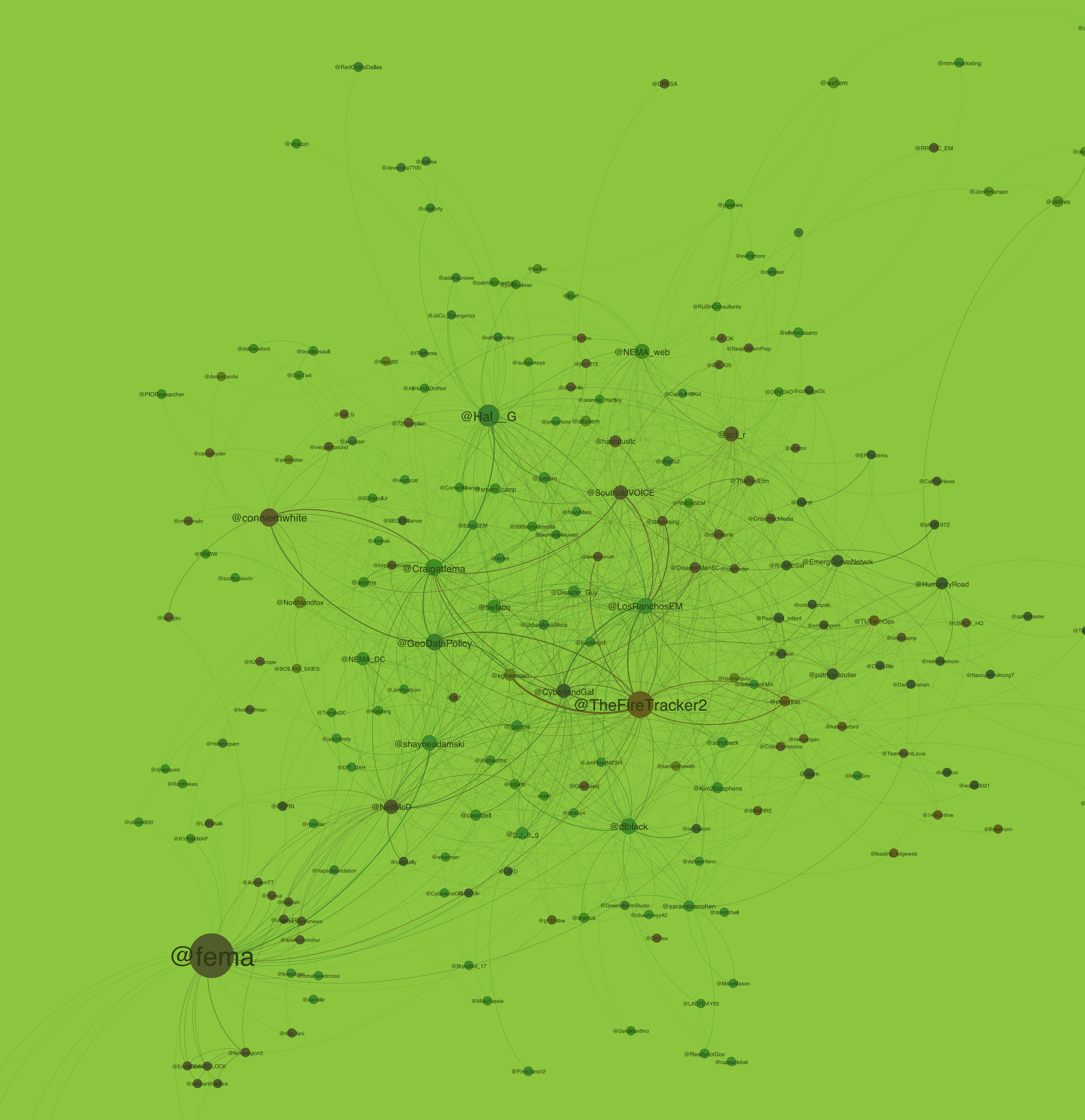
47. These are additional organizational elements within the Incident Command System (ICS). On large, complex incidents, the operations section may become very large—groups may be added to perform functional areas of the operation and maintain span of control.

48. Public Information Officers (PIOs) are critical supporting elements of the Joint Information System (JIS). A JIS provides a mechanism to coordinate information across participating response entities, including across multiple jurisdictions. In particular, it includes the plans and procedures to provide public information during response. The Joint Information Center, where PIOs sit during the response operation, exists to help facilitate execution of the JIS. A more detailed description can be found at http://www.fema.gov/emergency/nims/PublicInformation.shtm.

49. See the box, "Global Perspectives: Canada" for an expanded Canadian perspective on the integration of social media into a domestic response system.

50. In her 2009 master's thesis, "Optimizing Citizen Engagement during Emergencies through use of Web 2.0 Technologies," Laurie J. Van Leuven introduces several related concepts, including a prototype for a national information-sharing system (http://edocs.nps.edu/npspubs/scholarly/theses/2009/Mar/09Mar_Van_Leuven.pdf).

51. Project EPIC, which stands for Empowering the Public with Information in Crisis, is a multi-university research effort supported by a $2.8 million grant from the U.S. National Science Foundation. More infor-mation can be found at http://epic.cs.colorado.edu/.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