Trial by Fire:
The Deployment of Trusted Digital Volunteers in the 2011 Shadow Lake Fire

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ABSTRACT

We report on the use of a team of trusted digital volunteers during the 2011 Shadow Lake Fire that occurred in the US Pacific Northwest to extend the social media capacity of a Type I incident management team. In this case study, we outline the tools and processes used by this virtual team to coordinate their activities, monitor social media communication and to establish communications with the public around the event. Finally, we discuss the potential merits and limitations of implementing a team of trusted volunteers and explore how this idea could be incorporated into emergency management organizations.

Keywords

Crisis informatics, digital volunteers, emergency management, social media, trusted volunteers

INTRODUCTION

Information and communication technology (ICT) provides a means for emergency response organizations to communicate quickly and widely within their units as well as with external stakeholders. However, ICT advances have been rapid and have far outpaced emergency management's capacity to adapt. In particular, forms of ICT known as social media have introduced new ways for members of the public affected by a disaster event to communicate with friends and family, seek information and help, and provide assistance to others (Palen and Liu, 2007; Shklovski, Palen and Sutton, 2008; Palen, Vieweg, Liu and Hughes, 2009; Qu, Wu and Wang, 2009; Heverin and Zach, 2010; Starbird and Palen, 2011; Perng, Büscher, Halvorsrud, Wood, Stiso, Ramirez and Al-Akkad, 2012).

As social media use in the public arena increases, pressure placed on emergency managers to use these communication channels for information distribution is also rising. Additionally, emergency managers are experiencing new pressure to monitor and evaluate the public's online activities and incorporate the useful and relevant information back into emergency response efforts (Palen and Liu, 2007; Palen et al., 2009). A recent survey reports that US citizens have higher expectations around official emergency information being available over social media streams, and they expect emergency managers to monitor and respond to requests for help over these streams as well (American Red Cross, 2011). However, studies have shown that, to date, few emergency response organizations are equipped to do this kind of social media monitoring and communication at scale (Latonero and Shklovski, 2011; Hughes and Palen, under review).

Accompanying the demand from the public to use social media, emergency managers are recognizing social media's potential benefits. Information can be distributed quickly and to large audiences using social media. Further, emergency managers can bypass traditional media by sending information directly to the public. How social media will evolve emergency management (EM) communications is still in question, but practitioners are realizing that such arrangements carry the potential to allow conversational interactions with the public, in contrast to the traditional one-way communication procedural model (Sorensen and Sorensen, 2007; Latonero and Shklovski, 2011; Hughes and Palen, under review).

In response to these new expectations and possibilities, some emergency managers are beginning to incorporate social media into their communication plans. However, the road is not easy. Emergency managers sometimes lack the support of their organization to use social media. This might come in the form of policies that restrict

Proceedings of the 9th International ISCRAM Conference – Vancouver, Canada, April 2012
L. Rothkrantz, J. Ristvej and Z. Franco, eds.

1

social media use outright; or in the form of fear about assuming new risk; or in the form of indifference that limits the availability of resources and cooperative relationships that could support an effective social media communication plan. Further, the structures and procedures supporting EM organizations have been described as bureaucratic and rigid (Britton, 1989; Neal and Phillips, 1995; Buck, Trainor and Aguirre, 2006). These qualities can make it difficult for emergency organizations to fully incorporate social media communication with its loosely organized and emergent nature (Palen and Liu, 2007; Crowe, 2010)

In addition, social media presents challenges in its adoption, specifically with respect to the learning curve required to use social media tools and operate in an evolving information space. The many different types of social media are constantly changing, with new services appearing regularly. With all this heterogeneity, emergency managers find it hard to know what social media services they should incorporate into their practice. The temporal resources of emergency managers are already heavily taxed, and social media, though they carry the aura of a convenience technology, nevertheless require an investment of time to employ effectively (Latonero and Shklovski, 2011; Hughes and Palen, under review). Although social media supports the sharing of information, tools are not yet available for reliably capturing social media postings or tracking the new professional work activities that arise from the presence of social media.

Supporting Work with Virtual Teams

Increasingly, emergency managers in all capacities are aware of these concerns, and are seeking solutions to accommodate a changing landscape while simultaneously attending to the already demanding work of emergency response. In such a domain, it is crucial to look to practitioners themselves to see what mechanisms of adaption they innovate. One such recent innovation is a method for expanding an organization's resources through the use of a "virtual," remotely located team. Social media exchanges by definition cross geographies. With respect to emergency response work, Starbird and Palen (2011; 2012) have shown how distributed participants and the crowd that encircles them perform "work" over social media that is intended to aid response. However, the innovation of using social media to enable a designated virtual team which itself supports social media communications with the public—and, critically, to have that all incorporated into the *practice* of EM—is new, and one that needs examination.

A recent research review (Hiltz, Fjermestad, Ocker and Turoff, 2006) on virtual teams provides insight into these matters and concludes that size, project duration, and leadership contribute strongly to team success. Results from a survey of globally distributed teams (Bradner, Mark and Hertel, 2003) indicate that members of smaller teams (of 4-9 members): 1) participate more actively; 2) are more committed to team members; 3) are more aware of team goals; 4) are better acquainted with other team members' characteristics, and 5) report higher levels of rapport than larger teams (of 14-18 members). Additionally, virtual team relationships strengthened over time with more positive relationships correlating to longer project durations (Walther, Boos and Jonas, 2002). Leaders of what were deemed successful virtual teams were able to communicate information effectively, communicate roles and responsibilities among team members, and assert their authority in a way that members perceived as positive (Kayworth and Leidner, 2002).

In this paper, we examine a recent instance of a virtual team of trusted volunteers designed to manage and monitor social media communications in support of emergency incident response. The Virtual Operations Support Team (VOST) experiment—designed by emergency managers themselves—speaks to the need for EM participation in the social media "channel" during a crisis, while also having that activity support but not interfere with on-the-ground operations. The VOST concept in these early trials bridges notions of volunteer and professional by including people who are experienced in EM elsewhere but who are operating as volunteers in the current response.

Virtual Operations Support Team (VOST): Origins and Innovation

Early in 2011, emergency manager Jeff Phillips developed the VOST concept. As Phillips describes it, the VOST concept integrates 'trusted agents' into EM operations by creating a virtual team whose focus is to establish and monitor social media communication, manage communication channels with the public, and handle matters that can be executed remotely through digital means such as the management of donations or volunteers. In times of need, the support of a VOST can be enlisted to extend communication capacities and provide operational support. They feel that, ideally, an emergency manager who hopes to use a VOST would establish their team well in advance, so they are ready to be deployed when needed.

When Kris Eriksen, the Public Information Officer (PIO) for the National Incident Management Organization (NIMO) Portland Team, was called to the Shadow Lake Fire on August 31, 2011, she was aware of Phillips' idea and wanted to implement a VOST to help overcome some communication challenges she was facing.

Proceedings of the 9th International ISCRAM Conference – Vancouver, Canada, April 2012
L. Rothkrantz, J. Ristvej and Z. Franco, eds.

2

Through Twitter she put out a call for volunteers, to which Phillips was one of the initial respondents. Phillips then worked remotely to quickly assemble a team for Eriksen.

THE STUDY

Shadow Lake Fire

Ignited by lightning, the Shadow Lake Fire began on August 28, 2011 in the Mt. Washington Wilderness—15 miles northwest of Sisters, Oregon (USA) and seven miles west of Black Butte Ranch. The Portland NIMO Team, a Type I team, took over management of the fire on August 31. Type I incident management teams are the most highly trained federally certified teams. Comprised of members through interagency agreements, these teams are called to manage the most complex and threatening wildland fires. On August 31, the fire, though serious, was still relatively small at an approximate 364 acres. The team used an indirect suppression strategy common in remote wildfires: they monitored the fire closely and tried to confine it to the Mt. Washington Wilderness. This reduced the area's burn risk in future wildfires and offered the safest option for firefighters by not placing them in a remote area with heavy downed wood, no roads, and no readily available safety zones. Despite precautions, however, the conditions were such that the fire grew to over 10,000 acres, and resulted in the evacuation of the Big Lake Recreation Area on September 3. Firefighters gained the upper hand on September 14, and the fire was reduced to smolder and smoke by September 18.

Method

Seven of the eight VOST members agreed to be interviewed: federal PIO Eriksen, four emergency managers (one of whom was Phillips), the president of the regional Voluntary Organizations Active in Disaster (VOAD) and one citizen volunteer. Eriksen was the only member with official responsibility for the fire while the others were affiliated with the fire only as VOST members. Interviews were conducted over the phone or Skype. Those participants identified in this paper gave written permission to do so while the others remain anonymous.

We organized interview questions into four sections, each tailored to the role participants played in the VOST. Section I covered background information that led to the formation of the Shadow Lake Fire VOST and explored interview participants' motivations for joining the team. Section II focused on the technical implementation of the Shadow Lake Fire VOST, in which participants were asked what tools they used to manage communications both within the VOST and with members of the public. Section III asked participants to outline the VOST in-practice organization. Section IV asked participants to reflect on their experiences and how the VOST concept might operate in future events.

In addition to the interviews, we collected copies of supporting documents and obtained access to online resources used by the VOST (Table 1).

Resource	Description
InciWeb Incident Information System	The online incident information system used for official communication between the incident management team and the public
ORfireinfo Blog	Blog maintained by the VOST team containing latest information, photos, maps and videos during fire (orfireinfo.net)
ORFireInfo Facebook Page	Postings for the Shadow Lake Fire
ORfireInfo Twitter Account	ORfireInfo Twitter activity during the Shadow Lake Fire
ORFire Business Card	Used by PIOs with printed information and QR code with links to online sources
VOST Team Document	The Google document containing team information, operational objectives and daily activity log
VOST Group 'Skype Chat' Archive	An archive of the Skype Chat communication between members of the VOST team during the Shadow Lake Fire
Facebook Analytics File	Facebook Analytics File for ORFireInfo
Keepstream Archive	File archive of media monitoring activities and communication

Table 1: Documents and Online materials about the Shadow Lake Fire collected for analysis

Each of the public-facing media forms used in the Shadow Lake Fire were examined to understand content and how and to what degree they linked to one another, to official printed materials and to mainstream media sources. A diagram was created to visualize relationships between these public interfaces. An initial scan of each interface identified representative entries from each and characterize how they were used by the VOST.

The content of the Keepstream file, which is where the media monitoring activities were archived, was analyzed in detail,with each entry coded by source type (e.g. citizen, mainstream media, community organization), the

Proceedings of the 9th International ISCRAM Conference – Vancouver, Canada, April 2012
L. Rothkrantz, J. Ristvej and Z. Franco, eds.

3

type of social media used, and the media form of the content (e.g. link to mainstream media, video, text). Intra-team Skype chat was analyzed in depth to understand how members coordinated activities and organized themselves. The Skype chat was the primary form of communication during the fire. All this was compared to the Twitter and Facebook @ORFireInfo accounts to develop a posthoc overview of the coordinated work. Once completed, this stage of research generated a second round of questions to the VOST members that were answered through email.

FINDINGS: SHADOW LAKE FIRE VOST

Motivation for VOST Implementation

PIO Eriksen saw the Shadow Lake Fire as an opportunity to trial the VOST concept during a real event to see if and how it could help overcome obstacles when communicating with local communities. As a federal EM employee, her use of social media was restricted. Policy allowed her to take advantage of existing social media accounts in the surrounding communities or through the Forest Service, but she could not create new accounts to target a larger, affected set of communities. The official online site for federal teams is InciWeb, which PIOs must use to post press releases, images, contacts, and relevant links, yet it has limitations. The system is frequently down; when this happens there is no official backup or alternative place to post the latest information. Additionally, file size is restricted to 2MB, which means that detailed topographic maps, images, or videos cannot be posted. Furthermore, there is no means for comments on InciWeb, making it a unidirectional information source.

An increasingly tech savvy population, restrictive policies and limited official tools created the conditions for trialing a VOST given the limited risk to the public. In addition, community leaders from Sisters, Oregon made it clear that information-sharing with the public was a priority.

Startup Logistics

Selected VOST members had a combination of strong technical skills, social media savvy, and EM experience. Volunteers resided in different locations across the US, and consequently they relied on ICT for all interaction. These ICT are described above (Table 1), and also included Rondee Internet conferencing (voice conferencing), a gmail account (press releases) and a Dropbox account (file sharing). The Google document was modelled after ICS Form 204, a federal EM form, and summarized team objectives, contact details, availability, and activity. Skype Chat was the primary means of communication, but they used Internet conferencing when they needed to collaborate synchronously as a group over an audio connection. If something needed immediate attention they communicated by phone or through Twitter direct messaging. The team established a social media presence on Facebook, Twitter, and Wordpress using the identity *@ORFireInfo* (short for "Oregon Fire Information").

Both the team and tools were in place by August 31, when Eriksen finished her first briefing on the status of the fire. Afterwards, the VOST[1] met as a group for the first time to discuss how they would work as a team and determine team objectives, tasks, and assignments. Throughout the fire, Eriksen provided direction while Phillips coordinated VOST efforts.

Team size was intentionally kept small due to the sensitive nature of the project, but the three week duration of the fire and individual commitments put a strain on scheduling. During the fire, several members of the VOST left their roles to attend to other matters; two had limited availability throughout. As a result, one person joined the effort toward the end of the event. Though other members of the team provided mentoring and brought her up to speed quickly, she expressed how challenging it was to jump into an operation that had been underway for several weeks. VOST members recognized that adding depth to the team roster to cover instances where members become unavailable and detailed procedural documentation would have helped.

Work Practice

Though Eriksen and the VOST knew they had to work flexibly, they began with a vision of the work that would include classic PIO activities of media monitoring, management of the public's concerns, communication of the fire fighters' progress, and representation of the public's concerns (Table 2).

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[1] During the fire, Eriksen changed the name of the VOST to Virtual Information Operations Support (VIOS) so it would not be confused with her internal operations team. For consistency and clarity, we choose to refer to the team as a VOST throughout the paper instead of a VIOS. She sees VOIS as an instance of a VOST.

Proceedings of the 9th International ISCRAM Conference – Vancouver, Canada, April 2012
L. Rothkrantz, J. Ristvej and Z. Franco, eds.

4

Over the course of the three weeks they were active, members of the VOST reported falling into a routine. In the evening, PIO Eriksen would draft a press release based on information from the evening briefing with her NIMO Type 1 team. Before releasing it the next morning, she checked with the VOST for new information. From her office, Eriksen or someone on her PIO team monitored the VOST Skype Chat throughout the day. As new information became available, they updated the ORFireInfo blog and Facebook page, and used Twitter to send public messages and link information. Social media and mainstream media monitoring was documented through Keepstream. Occasionally they would use Internet conferencing for a voice discussion, but typically they found that Skype Chat worked best for communicating as a group and also directly with one another.

To most members of the VOST, management of the project appeared to run smoothly, but Eriksen reported that it was difficult to know how to manage a volunteer team that could not be officially recognized. No member of the internal PIO team, besides Eriksen, interacted directly with the VOST. Therefore, the PIO team was informally extended to include VOST efforts but the VOST was not formally integrated into the official response.

VOST Objectives/Tasks/Assignments
• *Follow social media and traditional media trends and report back what you are seeing* • *Communicate issues and concerns being expressed by the public* • *Identify misinformation or angry postings that need to be corrected or dealt with* • *Provide a supportive voice for the NIMO team and its efforts through social media* • *Push out key message each day (via personal and official Twitter accounts)* • *Post and tweet messages from private accounts with information from @ORfireInfo accounts* • *Represent the citizen's perspective* • *Compile media coverage (traditional and non-traditional) by date* • *Document the social media conversation – especially if something big happens* • *Take this opportunity to learn new tools and try new things* • *Document the experience of participating as a VOST member*

Table 2: Shadow Lake Fire VOST Objectives/Tasks/Assignments

Social Media Monitoring

The team reported using a range of tools to "watch and listen" while at the same time trying to maintain an archive. Any information they found was added to the Keepstream file and was referenced like a virtual file cabinet by the NIMO team. Eriksen was interested in capturing as complete a record as possible; duplication was not a concern. The VOST was instructed to communicate with her directly if they identified any negative coverage, irritated stakeholder groups, or citizen concerns that required her attention.

The Keepstream archive contained 121 entries between August 29-September 15, with over 60% of the entries captured between September 2-5. The content of the archive focused almost exclusively on mainstream media coverage of the fire with roughly one third of the entries captured as direct links to mainstream media web sites, one third as links to the ORFireInfo accounts and the remaining entries coming from social media accounts for mainstream media organizations, individuals and community organizations.

Communicating with the Public

The VOST used Twitter to direct people to new information as it became available using embedded links. New press releases on InciWeb, updates to the blog, and ORFireInfo Facebook updates were some of the information links they distributed over Twitter. The latest media reports, community information, and key status updates were also tweeted, with at least a few updates sent each day to maintain a dialogue with the community.

The ORFireInfo blog served as the primary communication interface used by the VOST to communicate with the public. On the blog, they positioned themselves as volunteers with access to the latest information and direct contact with the Type I team (through PIO Eriksen). This was done to establish a separation between content posted on their blog and official fire information posted on InciWeb. Much of the information provided on the blog was the same as that available through InciWeb, but they were able to add additional information that InciWeb could not support, such as full resolution maps, Google Earth tours, videos, photo galleries and community announcements. The blog also contained dynamically updated information such as the latest @ORFireInfo Tweets, and live webcam coverage from a neighboring resort.

Proceedings of the 9ᵗʰ International ISCRAM Conference – Vancouver, Canada, April 2012
L. Rothkrantz, J. Ristvej and Z. Franco, eds.

5

In addition, the ORFireInfo Facebook page supported direct conversation with the community. Much of the information between the Facebook postings and the blog overlapped, but on Facebook, members of the public initiated contact with the VOST and in turn the VOST would respond directly to information posted there. Those affected by the fire posted smoke reports, photos and videos. They asked questions, requested specific information, expressed frustration, and extended well wishes and thanks to the firefighters. VOST members then responded directly to the community in a timely manner and relayed important information back to the NIMO firefighting organization. These interactions with members of the public averaged roughly one per day throughout the duration of the fire.

Documentation

A required task for PIOs is to compile and document media coverage of an event. As Eriksen explains,

> *20 years ago, all we had was clippings from whatever newspapers we could find. 10 years ago we started being able to to go to the media websites and print copies of the stories. That was helpful because we could usually get print copies of TV or radio stories which previously had to go undocumented. Now we have all these search engines to help us find stuff.*

However, even though search engines ease the task of finding items, there is greater expectation that things will be found, and today there are more things to be found. This is a time-consuming task that Eriksen reports was a "huge time saver" that the VOST was able to contribute to the response.

The work activities of the VOST were officially recorded in the Activity Log portion of the VOST team document. It provided a high level summary of key objectives and a summary of activities that supported these objectives. In addition, the Skype chat archive provided an informal but highly detailed record of how they accomplished these objectives and coordinated their activities.

Documentation is important, but not all of it needs to be brought to the attention of the responding team on the ground. By *separating the concerns*, as we like to think about it, between what the incident command team must *know* during the emergency and what they need to *document*, the VOST could support the larger requirements of the institution of EM while not interfering with the work of the fire fighters. In providing this documentation service, they acted as a trusted filter for Ericksen:

> *…they found a blog by a guy… who was unhappy that some fire vehicles were misrouted and accidently ended up on the wrong back roads of the community… using small bridges that even school buses didn't drive over because they were historic and/or unsafe. And he didn't have much confidence in our ability to fight a fire when our trucks got lost in the woods. And he posted pictures. But because [the VOST] brought the blog to my attention, I was able to grab the Liaison Officer, show him, talk about it and we sent him out to meet with the man, walk over the bridges, check for damage and basically deal with and defuse a situation that could have caused us community conflict. That's EXACTLY what I need a [VOST] to do.*

Finding good technical support for documentation was harder than the strength of desire to do it, but this trial suggests that the opportunity to outsource such a task to skilled volunteers could helpfully support response teams.

Logging of their work in the activity log was inconsistent, one participant reported. The reasons for this are unclear and require more investigation, but they *could* include the following: 1) traces of the team's actions and decisions were recorded through their social media activity and conversation on the Skype chat, so motivation to log was low; 2) the activity log could not capture the nature of the work well and therefore the tools and processes need to be improved; 3) expectation to log is impractical for the nature of the work; 4) connection to the effort was too removed to generate enough personal incentive to record. This concern around logging remains an open question that needs to be further explored with direct examination of work practice, which could not be done in this post hoc study.

Coordination

Members of the VOST indicated that the Skype chat played a pivotal role in coordinating their efforts. An analysis of the chat revealed rich coordination within this environment. Member presence and availability were communicated here, and ideas about how to conduct themselves were discussed in detail. They also used it to report independent activity. A reading of the chat logs show tightly coordinated teamwork, displays of trust, and camaraderie, as the following excerpt illustrates:

Proceedings of the 9th International ISCRAM Conference – Vancouver, Canada, April 2012
L. Rothkrantz, J. Ristvej and Z. Franco, eds.

6

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[9/3/11 11:31:31] Kris Eriksen: …Just a heads up to all. We are poised to
start evacuations in Big Lake Camp area. The fire is moving west and pretty
windy. Asking for volunteers to leave now but haven't pulled the trigger
yet. But I need you all to stand by
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Eriksen makes active use of the VOST, ensuring they are aware of incident command team activities, and the implications they will have on VOST work.

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[9/3/11 11:32:22] Jeff Phillips: i will text the group as a heads up.

[9/3/11 11:32:44] Kris Eriksen: thanks. Getting a bit ummmmm well you know!!
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A VOST member responds to the notification in less than a minute, and prepares to activate the rest of the team via SMS, presumably to assure their attention to a common medium. Eriksen acknowledges the confirmation.

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[9/3/11 12:26:21] Kris Eriksen: IC just told me that. And, not for public
yet but we are recommending to the sheriff that the Big Lake area be
evacuated by 1500 today. When thats confirmed i will let you know.
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Later, Eriksen makes reference to the incident commander (IC), demonstrating much more than superficial integration of VOST with her work, and a display of trust. In the exchanges that follow, we see rapid acknowledgment by Phillips of what is to come, as well as communication of what he intends to do. A third VOST member, over the course of less than 4 minutes, tells the team of his action that resulted from this communication, but also asks for a check on his work:

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[9/3/11 12:26:42] Jeff Phillips: copy
…
[9/3/11 12:29:26] Jeff Phillips: 2 follow up tweets with specific language
from advisory

[9/3/11 12:30:42] <Vost Member>: I just dropped a piece of text in - can
Kris & Jeff come help me shape this so I can make it a PDF and upload for
linking?

[9/3/11 12:32:16] Jeff Phillips: …best just to link to inciweb page now that
it's up http://inciweb.org/incident/article/2550/12930/ imo

[9/3/11 12:32:34] <Vost Member>: okay that's great and much easier
```

Above, the VOST members work out where and how to post information across multiple media venues, providing direct links to get to information rapidly. Despite the work of the last VOST member, the information was already posted to the sometimes erratic InciWeb, and so they expedite their work to make use of that material. They continue to coordinate to make sure the information propagates across the media they support:

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[9/3/11 12:33:16] Jeff Phillips: can you place the link and snippet on a
couple of the local fb pages?

[9/3/11 12:36:10] Kris Eriksen: thanks guys.
```

The text format of chat serves another important function; it provides documentation of decisions and conversations between members of the team. Members of the VOST reported that they used the text as a means to catch up on communication before they began their shifts, without interrupting others. It allowed team members to jump in and contribute without the high overhead of context-setting. The NIMO team used it as a means to "listen in" and scan for new information.
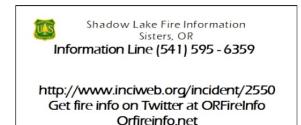
Integration of VOST work into Formal PIO work

One challenge Eriksen faces as a Type 1 PIO who responds to events across the US, is that every event requires her to quickly determine what existing communication channels are locally in place and how she can integrate with those channels most effectively. As we explained above, the VOST team made sure that information sources were interlinked, so that access to one resulted in audience exposure to others.

Eriksen, in turn, created ways to communicate these sources to local communities. In addition to traditional media, she used information booths and bulletin boards to share information—classic PIO practice. However, on the back of the business cards she distributed, she printed QR codes that linked directly to both official information sources as well as VOST-created information sources (Figure 1).

In addition to the creativity on display here with the use of QR codes, several other messages are signaled. First, the QR codes signal a high-tech response to the community, something that will likely be an important attribute of future emergency response. In this way, they were probably perceived as additionally *responsive* to the

Proceedings of the 9th International ISCRAM Conference – Vancouver, Canada, April 2012
L. Rothkrantz, J. Ristvej and Z. Franco, eds.

7

public. Second, Eriksen publicly aligns both the official sources and the VOST-created social media source together (ie., the Twitter account that the VOST put in place, the one she could not). Finally, the last important signal of this action is the high degree of trust the lead PIO put in the VOST. In these actions, Eriksen makes legitimate the VOST as an extension of her PIO duties.
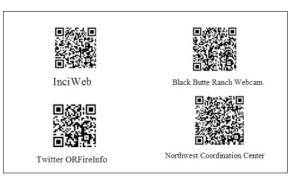

Figure 1: Front and Back of Business Card Used to Distribute Information about the Shadow Lake Fire

Campaigning for a New Idea

Members of the VOST and those who supported them understood that this was an opportunity to trial a new idea that would bring the possibilities of social media into EM. For that reason, there was a sense of advocacy about the idea, a sense that comes through in the participant reporting. Nevertheless, participants were self-aware: they conveyed a sense of knowing they were campaigning against resistance that has only recently started to soften. Overall, participants reported the effort going smoothly, and for the scope of the effort, the research concurs that it likely did. However, this is *an important message for practitioners and policymakers*: it is imperative that the institution of EM become open about the possibilities of social media, precisely so we can critically examine its successes and failures. If users of social media must assume a stance of advocacy in the face of unyielding resistance, then our ability to examine its prospects and problems with a critical eye is limited.

DISCUSSION

Our data show that interviewees frequently identified the ability to extend the support capacity of a local EM team as a key benefit of using trusted volunteers. A team of trusted digital volunteers has the potential to offer additional coverage to what a local EM team can provide. An additional characteristic of this volunteer model is that it is located outside of the impact area, and therefore not affected by power outages, adverse weather conditions or other service disruptions. This was beneficial in the first few days of the Shadow Lake Fire while the Type 1 team worked through connectivity issues with wireless and cell phone coverage when setting up their operations base in a remote area. Further, with team members working from different time zones, they were able to provide an added level of monitoring beyond the waking hours at the emergency site.

Some of the perceived success of the Shadow Lake Fire VOST could be attributed to having qualities of a successful virtual team (Hiltz et al., 2006): a small team size, extended project duration, and strong leadership. The size of the VOST team was small at a total of eight members. Many members of the team had worked together before in prior exercises so they were familiar with each other's skills and work habits. VOST coverage for the Shadow Lake Fire lasted for three weeks, giving team members an opportunity to establish a shared work practice. Lastly, the Shadow Lake Fire VOST was internally led by Phillips who had a passion to make the team and its work a success.

It is not yet clear that some of these attributes—such as small team size—would be beneficial in all events. For example, the intended VOST design assumes that as resources grow, team members will be organized in small teams with a leader to oversee individual team activities. This may help teams maintain a workable size, but it does not address the logging of increased activity. Practitioners felt that they needed an audit trail; this is perceived as important to the practice of PIO work. In this event we see this value being expressed through concern about using a federal EM form (ICS Form 204) to organize their activities and archiving of their chat. However this growth is managed, there will need to be a consistent way of capturing and providing a clear audit trail of team activity.

Through the data reported here, we have examined the ways this configuration was made successful. For expansion of the trusted volunteer to a larger deployment, questions, of course, remain. Of particular concern are those surrounding legal liabilities. Who is responsible for information shared by these teams? Would the

Proceedings of the 9th International ISCRAM Conference – Vancouver, Canada, April 2012
L. Rothkrantz, J. Ristvej and Z. Franco, eds.

8

individual members or the team need to be indemnified or protected from mistakes that will undoubtedly arise? Red Cross volunteers are protected by the agency to whom they belong and from whom they received training. A future formalized digital volunteer workforce and the response teams they support will likely be most successful under similar arrangements.

Logistically, incorporation of trusted volunteers might require an additional layer of management, perhaps one that acts as team lead, as its designer imagined, located remotely. However, this person might not be a volunteer and instead be directly affiliated with the response. This might mitigate the liability issue to a degree, and be conceptualized instead as a remotely located expansion of the PIO team with the lead being responsible for local oversight of tasks. In addition, because mass emergencies have uncertain duration, a plan for rotation and replacement needs to be in place, with minimum duration and overlapping schedules to ensure sufficient organizational learning. Though it is possible in theory to support many volunteers on rotation, continuity through a small, focused operation would likely be the most beneficial, and more likely to be trusted.

Finally, when trusted volunteers are managed by a PIO staff member on the incident management team, the relationship that trusted volunteers have to municipal, state and other area PIOs can become problematic. Is the team an arm of the responding incident management team? Is their information access to the responding team differently privileged from other area emergency responders? Trusted volunteers would likely need to be incorporated into a clear chain of command so they know to whom they are responsible and what their relationships across the response effort are meant to be. It is possible they could be an asset to the entire local system of emergency response, but just as agencies have agreements about the nature of their inter-coordination, so too must trusted volunteers be deliberately incorporated into the larger ecology of response.

Solutions described here were no doubt successful because they were carefully adapted to the incident. We take this as an important point, and suggest that deployment of VOSTs be conducted in these early days when there is sufficient time and overt commitment to adapt the team to the event. Though we might be able to trial VOSTs in emergency simulations, only real events will deeply stress test the concept. Likewise, real events are more likely to give way to socio-technical innovations and improvisations that show its future promise. It is essential that the VOSTs are successful because the response to the incident must be successful. The means to long-term effective solutions, then, lie not in "proving" viability, but rather in *actively designing interim viable outcomes.*

How to do this? We are now in a situation where we can no longer resist the prospects of social media in EM, but instead determine how best to make use of it; therefore, trials must be closely shepherded and adapted to each situation. Ideally, events like these—serious events that have an audience, but with limited physical risk to people—will be used to scaffold and establish the practice, though it needs to be done rapidly. The demands of the public will likely outpace slow evaluation, and a large disaster is unfortunately the kind of situation for which trusted volunteers could help a strapped formal response. To that end, our ability to provide tools to directly support the work practices of an extended PIO branch—including trusted volunteers—to manage and respond to social media communications is a critical concurrent piece of progress that must be made.

SUMMARY

The attempt to employ a team of trusted volunteers is an example of socio-technical innovation in times of disaster by the emergency management community. This case shows how emergency managers have begun to look within their own communities for help. They appreciate the role of existing remote volunteers, and extend the idea by finding trusted agents who could help when information demands during emergencies outstrip capacity to respond. In this examination, we learn about how a nascent team of trusted volunteers internally operates, and how the formal response coordinates with it. Their experiences also raise questions that, given this perceived local success, need to be addressed to make it possible to extend the idea of a trusted volunteer network in support of larger emergency management aims.

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L. Rothkrantz, J. Ristvej and Z. Franco, eds.

9

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10