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Introduction

Technology has the potential to fundamentally change and challenge the humanitarian space. The global rise in mobile phones and open source mapping software is converging to produce new platforms that can be used to create unprecedented "live maps" of humanitarian crises. An example of this convergence is the Ushahidi platform, a free and open source mapping tool first used to document human rights violations during the 2007/2008 post-election violence in Kenya. The name Ushahidi means "witness" in Swahili and lends its name to both the platform and the organization that developed it. Unlike other mapping initiatives, this one was completely public and made use of mobile phones to collect (or crowdsource) reports of human rights abuses. A short code was set up to allow anyone in Kenya to text in reports for free.[2] These reports would then be manually mapped on the Ushahidi platform and accessible on the web as a "live map." Exactly two years after Kenya, Ushahidi and volunteers at The Fletcher School used the mapping software to create a live map of Haiti just hours after the earthquake struck. Days later, a coalition of partners set up a short code for Haiti—a project called Mission 4636—to allow anyone in the country to text in their location and most urgent needs while thousands of volunteers rallied to translate these text messages from Haitian Creole to English. Volunteers at Fletcher would then identify the most pressing translated messages and add those directly to the live map of Haiti, a process called "crisis mapping." This entire initiative was volunteer-based and thus organized outside all official channels.

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The purpose of this paper is to critically analyze the use of text messaging and crisis mapping in disaster response by drawing on Haiti as a case study. We first describe the design and deployment of the system. Next we outline what worked and did not work. We then consider the organizational and institutional implications of this response and articulate some policy recommendations. Finally, we outline the need for an SMS Code of Conduct for Disaster Response and propose one for consideration by the humanitarian community.

Case Study: Haiti

Within hours of the January 12 earthquake, it became clear that most of Haiti's cell phone towers were still operational and that within a very short time text messages were getting though. However, it was also clear that the existing emergency reporting and response systems had failed. Text messaging (SMS) is the primary means of remote communication in Haiti, surpassing email, traditional mail and often (for pricing and reliability) actual phone calls. Following the earthquake, a group of people, all connected by Josh Nesbit of FrontlineSMS:Medic, a technology company that uses its own software platform for communication and patient follow-up, came together very quickly to design and implement an SMS-based emergency reporting and response system.

The Design

The system was initially conceived as a means for reporting information about missing people. It was clear, though, that if a reporting service was made available to the general population within Haiti, people would be reporting a wide range of concerns. It was thus decided that the service would be a general means for people to report emergency needs. There were a number of organizations involved in the design process: (alphabetically) ActiveXperts, Energy for Opportunity, FrontLineSMS:Medic, Sahana, Ushahidi, Votident.

As the majority of the messages would be sent in Haitian Creole and the responders predominantly spoke English, the system was designed as a microtasking platform where volunteer crowdsourced speakers of Haitian Creole could translate the messages as they arrived, categorize them and plot the address on a map. The translated and geolocated messages would then be streamed back to the emergency responders.

The shortcode '4636' was secured on Digicel, Haiti's largest phone network, through a further contact of Josh Nesbit. The short code was owned by DigiPoint, a partner of Digicel, who was using the number as a subscription-based alert system.

The Deployment of the System

Within forty-eight hours a translation platform was built that allowed people to translate messages as they arrived. The platform was (predominantly) built by Brian Herbert of Ushahidi, and the translation and shift

to a sustainable platform was coordinated by Robert Munro. Over the first few days, more than 1000 people (mostly the Haitian diaspora) came online to help translate the messages as they arrived. They were found quickly through social media and word-of-mouth, and consisted of a mix of lone volunteers, Haitian expat organizations, crisis relief specialists, and professional translators. Within a week, around a thousand messages per day were arriving. The average turnaround time for a message to be translated, categorized, geolocated, and back in the hands of the emergency responders in Haiti was ten minutes.

When the system was deployed, a number of organizations began to use the translated/geolocated messages for relief efforts within a short amount of time. The major organization taking the messages was Ushahidi itself. In a parallel effort, a team of crisis-mappers in Boston had been mapping crisis information from emails, Facebook, and radio. They began incorporating the stream of messages sent to 4636, refining the coordinates and identifying the actionable items. Within two days of launch, the United States Marine Corps were taking the information from the Ushahidi team in Boston and responding to emergency requests.

The initial publicity for the '4636' number within Haiti was conducted over radio. The Thompson Reuters Foundation (TRF) was in Haiti and directly contacted the main station, Signal FM, in order to spread the word within Haiti about the service. Working with their technical partner, InSTEDD, they also took a feed of the messages to use for a broadcast service where people in Haiti would receive regular updates by SMS.

At this point, the messages were streamed directly from Digicel to the translation system. While much of the translation and plotting systems were well-tested systems, the microtasking aspects of it were created from scratch. This part of the service was transferred to CrowdFlower, a professional crowdsourcing platform, after two weeks, providing the services needed for a more robust platform (a greater guarantee of server up-time, tracking the tasks completed by different workers, etc.). At the first meetings with CrowdFlower it was learned that Samasource, a frequent partner of CrowdFlower, had signed a deal with workers in Haiti to establish a microtasking center just minutes before the earthquake. In the wake of the earthquake, the workers needed employment more than ever, and so over the following month the translation service was transferred from volunteers to the workers in Haiti. Samasource quickly came on board, too, arranging for the service to ultimately be transferred to paid workers in Haiti.

What Worked and What Did Not

Collaborative Crowdsourcing

A person working alone over the Internet is not in a "crowd." The professionals and volunteers working on translation platform collaborated in a simple online chat room. Over the first few weeks, almost 50,000 exchanges took place there. It allowed people to collaborate in order to identify hard-to-find locations, share information about changing conditions

on the ground, and in particular share questions/answers about ambiguous translations and work procedures. Without a doubt it also enabled people to maintain their motivation simply by being part of a community. For the crisis-mappers, the sense of community was also key to the process, but in this case they were all located in the same physical space at Tufts University's Fletcher School in Boston. It is difficult to quantify the effectiveness of collaborative crowdsourcing. That is, we cannot compare the quality of the work undertaken collectively to work undertaken in isolation, as all the work in this case study occurred in collaborative environments. However it is clear that the sense of community that is fostered by collaborative environments made a huge difference in the motivation of those people who stepped up to help. The most prolific translator spoke of the collaborative environment this way:

> "It's so great to see so many people, from different backgrounds, cultures, countries, come together to help the Haitian people. I met amazing people . . . Those people spent hours here, day and night translating Creole messages and geolocating places on the Haitian map. Their devotion, care and kind words kept me going."

Clearly, it is the shared commitment of people who were physically remote from each other but working together in an online collaborative environment that built a strong community around this key step in the emergency response processes.

We can find more quantifiable evidence that collaboration improved the quality of translations and geolocations by examining the conversations between translators in the translation chat room:

> *D:* I need Thomassin "A" please.
>
> *A:* Kenscoff Route: Lat: 18.495746829274168, Long:-72.31849193572998.
>
> *A:* This Area after Petion-Ville and Pelerin 5 is not on Google Map. We have no street names.

In this exchange, "D" is translating a message, but does not know the address of "Thomassin," and so they are requesting this information of "A" within the chat room. "A" returns with the exact coordinates, and qualifies that this information is not available on Google Maps. Using their local knowledge of Haiti, "A" is able to click on a map where they know "Thomassin" to be located (even in the absence of labels) generating the exact coordinates. "A" then shares this with "D" in the chat room, who in turn submits the translation of the message along with the exact coordinates. The collaboration therefore allowed the translators to optimize their knowledge of Haitian geography beyond the individual knowledge of any one person. There are more than 200 exchanges sharing coordinates in the logs of this chat room from the first two weeks following the earthquake.

Translation Platforms

The decision to crowdsource the translation of messages was an unprecedented strategy, but it was necessary and fortunately a success in this case as translation services within Haiti were stretched well beyond the capacity. Two crowdsourcing translation platforms were used, one created during the forty-eight hour period before launch and hosted by NGOs, and one hosted by a professional crowdsourcing/microtasking company. The latter had the advantage of being a robust system, with appropriate backups of data, server uptime and quality control. The former had the advantage of being rapidly (and continually) developed for the precise task required. The NGO-hosted system did not lose a single message and the potential security holes were never exploited by malignant parties, but this was a concern from launch and the main motivation for moving to a professionally hosted service. The UI design for the professionally hosted system was based on the one created by the NGOs, so the two cannot be contrasted in terms of user experience. One crucial feature of both systems was a "queue" number, indicating the number of incoming messages at any given moment that needed to be translated. It was necessary to control for fluctuations in the number of incoming messages by engaging different volumes of people at different times. The queue allowed the volunteers to self-regulate based on the number of the messages pending translation. There were approximately a dozen people who routinely rallied volunteer translators as needed. As soon as the queue number rose, these people were able to post across social media platforms (Facebook in particular) to pull in additional translators as needed. The reverse end of the queue was also as important—as the queue hovered near zero towards the end of each day, the translators could permit themselves to take well-needed breaks.

Mapping platforms

In a public speech on Haiti on 21 January, 2010, Secretary of State Hillary Clinton noted that the technology community had set up interactive maps to help identify needs and target resources.[3] One of the main interactive maps used during the disaster response was the Ushahidi "live map" of Haiti which FEMA praised as being the most comprehensive and up-to-date source of information on Haiti for the humanitarian community.[4] The U.S. Coast Guard, U.S. Marine Corps and other first responders used the interactive map as part of their operations.

The Ushahidi platform for Haiti was set up just hours after the earthquake. The platform was launched by Patrick Meier and David Kobia from Ushahidi around 8:00 p.m. on January 12. The front end of the platform was customized in collaboration with United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA) in Colombia and Meedan in Seattle. The back end was modified by the Ushahidi tech team almost every day for three consecutive weeks. This was necessary because the Ushahidi mapping software had never been used so intensively with so many critical reports being mapped around the clock. As the tech team noted, "We were fixing the engine while flying at 30,000 feet." Even with

this technical support, however, the back end was not equipped to manage thousands of text messages or hundreds of volunteers. In other words, the functionalities of Ushahidi did not provide an easy and efficient way to (1) sort and map incoming SMS messages; and (2) allow a large number of volunteers with different levels of access privileges to work directly from the back-end. This explains why another system was built from scratch by Crisis Camp Boston. Called the RT system, the platform was an SMS management tool that facilitated the sorting and mapping of incoming text messages. It was also a "ticketing" tool that allowed numerous volunteers to collaborate in processing large numbers of text messages. Other than these challenges, the Ushahidi mapping software was easy to use and rapidly deployable. A few other interactive maps were launched in the wake of the earthquake but these were not the primary platforms used to display the most urgent SMS coming from Mission 4636. These included OpenStreetMap (OSM), Sahana, and HyperCube.[5] The former and latter were invaluable in helping Fletcher volunteers identify GPS coordinates for the alerts communicated via SMS. To be sure, the OSM for Haiti quickly became the best source of information for data on street maps—it was quickly populated in another crowdsourcing effort with notable input by crisis commons. HyperCube provided an excellent mashup of relevant data for Haiti, pulling in information from Ushahidi and OSM.

Network Connections

In this case study, there are cases of both local professional companies and international NGOs maintaining the network connections that delivered the messages from the telephone companies to the emergency response system (that is, the purely technical step of passing the SMS from the telephone companies to the people managing the response to them). The former was much more successful. The connection established with Digipoint's 4636 shortcode (working with Digicel and Votident) did not fail once. It was created within a matter of hours at launch—the most critical time—and remained a reliable delivery service. By comparison, the connection that an international NGO established (first with Comcel and then with Digicel after several weeks) had outages that caused small delays almost daily and struggled to correctly deliver accented characters. In addition, as the NGO was routing the messages through several redundant steps within their own software systems, it took several days to establish the connection that required ad hoc internal software changes meaning that the messages were being redundantly routed through untested software before they were seen by those able to respond them. For any potential outages in the professionally hosted service they were identified automatically by the companies serving the messages and were immediately corrected, meaning that the delivery of messages was seamless (this was also reportedly true of Twitter's 40404 short code in Haiti during this time). When the NGO was controlling this part of the service, the responsibility to monitor network outages fell on the responders themselves. These responders would in turn need to communicate this information to the NGO hosting the connection,

whose technical staff was often located an entire twelve-hour time zone away from Haiti. This took a great toll on the resources of the responders as in addition to their core tasks they needed to constantly monitor this connection. It was also a burden on the NGO, which was not in a position to provide on-demand twenty-four-hour support of such a service while focused on projects in other parts of the world.

Sharing a Short code

The NGO took over the service of delivering the messages in order to share the shortcode, allowing them to send messages to "subscribers" giving general instructions to the Haitian population. When they started using the 4636 number for outgoing messages, the emergency response services were hit by a massive volume of messages from people replying to the blasts—hundreds within minutes of each blast. The responders were not prepared for this volume of erroneous messages, and on the first day this happened the messages were delayed by hours as a result of needing to scramble to find enough translators. Unfortunately, Thompson Reuters Foundation, the organization controlling the outgoing blasts, did not communicate to the responders that they had started using the 4636 code for outgoing blasts of information and it took three days before the responders realized the waves of erroneous messages were the result of these blasts. Even members of organizations that were sending the blasts were not aware that they had started using 4636 for outgoing blasts, which ultimately compounded the amount of time required by the responders to diagnose the cause of the erroneous messages.

Replying to Messages and Information Blasts

The information "blasts" were one-way communication systems. There was a much richer system in operation which allowed people to reply to individual messages, much of which utilized the same short code from day one. Among the translators there were at least fifty people, mostly the Haitian diaspora, who were replying to individual messages using their own phones or online SMS services. Collaborating with each other, they were collating the maps of food and aid stations and adding them to the Ushahidi/OpenSource maps. They were undertaking a number of services, such as directing people in Haiti to the nearest aid points and places to recharge phones, passing on instructions from aid agencies about obtaining food vouchers and fuel, and informing people outside of Haiti of the safety of their loved ones. The diaspora were in constant contact with their own friends and relatives in Haiti and used this information to update the maps and share information. For example, one of the volunteers had a cousin who worked at one of the hospitals and would share information when beds were available. The volunteers sent thousands of different messages in this way to people who used the 4636 service. From about the third day, everyone in Haiti who could use SMS was already in regular contact with a large social network both within Haiti and among the diaspora. This distributed architecture is the most powerful use for SMS, but it is not one that naturally lends itself

to centralized control. Both technically and socially, SMS is more of a peer-to-peer communication service than a broadcast medium. The power lies in distributed systems, not channeling all communication through one centrally controlled service. Unfortunately, this rich two-way information service cut back operations when the blasts went out on the 4636 number—the volunteer translators were swamped by the task of trying to separate the emergencies from the erroneous messages. The erroneous replies outnumbered the legitimate, unprompted messages by at least ten to one. To the credit of the Thompson Reuters Foundation, they attempted to switch to another short code as soon as they realized that they were jeopardizing the emergency response service and were also planning on mobilizing a workforce to reply to messages, although this was never completed.

Providing a Reliable Subscription Service

The subscription service meant that anyone who texted 4636 was automatically subscribed to the information blasts. Unfortunately, this was deployed unevenly. While the service was advertised to all Haitians, for the first three weeks it was only available to people on the Comcel/Voila network (less than 20 percent of cell phone users). Subscribers from the larger network Digicel (70 percent of all cell phones in Haiti prior to the earthquake, and approaching 80 percent following) did not receive the blasts even if they tried to subscribe. During these crucial first three weeks, therefore, the majority of people who tried to subscribe received nothing. Despite the fact that all messages sent to 4636 were received by responders, the inability to subscribe led to distrust. Further, many people were not aware that when they were reporting emergencies they were also subscribing to this service, and many people in Haiti replied to specifically complain about the large volume of unsolicited messages they had received. Because there was not an unsubscribe mechanism in place, these requests went unanswered.

Communication Between Organizations

There were more than a dozen separate organizations working together. All strategic designs were made in open chat rooms, allowing complete transparency (and in the case of this article, easy auditing). The openness of communication and speed at which decisions were reached was, overall, exemplary. As many people have commented, it is largely unprecedented for so many organizations to come together so quickly to build such a service, and open collaboration was the key. The one exception was, as discussed above, the decision to use the same short code for the outgoing information blasts. The organizations conducting the broadcasts did not take part in the strategic design of the 4636 system, although they did help with publicity at launch. After the blasts resulted in waves of erroneous replies that threatened the emergency response system, TRF asked their technical partners to remove the "4636" as a reply-to for these messages. This simple solution would mean that people receiving the blasts could not reply to a broadcast message, but as a compromise it would allow the dual services to continue.

The technical partners chose not to do this and instead added the Digicel network several days later, again without notifying the partner organizations. Even the Haitian owners of the 4636 short code were not informed that their connection was being replaced. These poor choices led to the only serious delays in emergency messages being processed. When the emergency response translators finally realized the cause and saw the blasts, this was one of the first reactions to the blast messages:

> "Gosh, you really can trace almost every surge of non-emergency SMS messages on our translation site to one of these messages!"
>
> This was an apparent demotivation for the translation teams, as evidenced from the chat room:
>
> "People are answering the messages sent to them are making more work for us which I wouldn't mind, but I haven't seen an urgent message in a while."
>
> "I still think who ever is telling them to contact 4636 in Haiti is doing it WRONG . . . they send anything. And on the Ground, who ever is telling them to txt 4636 is giving the wrong info."

During these replies to blasts, the larger surges required triaging of translation, where the translators only translated emergencies and left the non-emergencies in order to speed up the process. For the first time, therefore, the final decision about each message could not go through to the actual responders. When every message (regardless of content) was being translated, the professional emergency response teams (speaking only English) had the opportunity to re-evaluate every message for potential actionable content or simply to cluster similar topics by geography for greater relief intelligence. Every message was able to be translated during the critical period following the earthquake, so it should have been avoidable that the emergency response service was compromised several weeks later as organizations jostled for use of the same short code.

To keep this one shortcoming in perspective, though, this resulted in about one week of bursts of less-than-optimal service. It paralleled the move to a sustainable crowdsourcing hosting service and paid workers in Haiti, so these disruptions aside, the collective as a whole was moving forward at this time.

Transferring to Local Ownership

The use of an out-of-country workforce for emergency response was a temporary solution. Motivating an unpaid workforce after one month is a difficult task even among the most dedicated volunteers. In this case, it was fortuitous that an existing relationship between Samasource and the team in Haiti could be utilized to transfer the translation service to Haitian ownership, creating jobs where they are needed most. The paid workers in Haiti were using the same online platform as the volunteers, so the transition in terms of technology was seamless. The fact that they

used the same platform proved to be an important factor. For the first few weeks after the changeover to paid workers in Haiti there was intermittent internet connectivity which meant that volunteers outside the country were still being relied on for the relatively slow traffic periods overnight. Operationally, it was more ideal that this could occur within one system. At the time of writing, the mapping component of the system is also being transferred to workers in Haiti, with a local technical organization, Solutions, providing the technical support for a long-term platform that integrates both SMS and voice communications.

Organizational Implications

Mission 4636 and the "live map" of Haiti were relatively unprecedented initiatives in the field of humanitarian response. This is especially true since both projects were initiated outside of any organizational or instutional channels. To be sure, the projects were not only novel but entirely volunteer driven. This naturally raises questions about the replicability of these initiatives in future crises. For example, how can this "surge mapping capacity" be guaranteed? Indeed, can private, volunteer-based initiatives suffice to reproduce the results in Haiti? What role, if any, should governments and international organizations play in creating the infrastructure for effective crisis mapping in the future? And finally, what options exist if certain repressive governments have a political interest in preventing the deployment of a "live map" detailing a crisis within their own borders?

About six weeks after the Haiti earthquake a second one struck Chile, this time with a magnitude of 8.8 on the Richter Scale. Within hours, Patrick Meier and David Kobia launched an Ushahidi "live map" of Chile. Some 36 hours later, about 60 graduate students from Columbia University's School of International and Public Affairs (SIPA) took the lead in creating the live map of Chile. The volunteer students at SIPA quickly learned from the team at The Fletcher School and in effect replicated the "surge mapping capacity" from the month before. Today, core volunteers from both professional schools are joining forces to create one reliable network called the Konpa Group (Konpa is Haitian Creole for "compass"). The group has not been officially launched yet so it is still too early to tell what impact it will have on the field of crisis mapping and whether a largely volunteer-based network can provide the reliability that humanitarian actors need in crisis response operations. For example, the recent floods that affected some four million people in Pakistan did not trigger the deployment of a live crisis map although the massive Russian fires did.

While international organizations today often use free and open source platforms (largely due to budget cuts in information management), their main concern from the experience in Haiti is the reliability of the information collected using crowdsourcing. Humanitarian actors prefer to use their own field personnel to collect information on needs and damage since they can treat their own channels as reliable. Of course, having field

personnel in place and ready to report before a disaster is the preferred route. But in cases where the disaster affected communties are the only source of information, an open crowdsourcing approach may be the only way to collect early information on possible damage, which is arguably better than no information. This was the prevalent feeling among some humanitarian professionals in Haiti where the challenge had more to do with integrating crowdsourced information in their own analysis than concerns over reliability of information.

In any case, while some humanitarian organizations like OCHA country offices and Mercy Corps may eventually deploy their own Ushahidi platforms using their own personnel, the challenge of integrating open crowdsourced information in official channels remains. This means that international organizations are unlikely to allocate scarce resources to support volunteer-driven crisis mapping initiatives in the near future. Institutional change takes time.

What if a cyclone were to strike the country of Burma again? Would volunteer groups be able to launch a "live map" of the disaster? This question verges more on the topic of digital activism in non-permissive environments, which goes beyond the scope of this paper. That said, the Ushahidi platform was recently deployed to monitor the elections in Sudan. A local Sudanese civil society group acquired two short codes that were used by hundreds of dedicated field monitors across the country to document evidence of election irregularities. The platform was blocked by the Sudanese government about two days after it was launched. The civil society group worked with other colleagues to circumvent the censorship. The platform came back online a day or two later.

SMS Code of Conduct

Instead of a conclusion, we propose an SMS code of conduct for disaster response. The humanitarian field has established a number of standards to guide humanitarian action. The Sphere Project, for example, has established a humanitarian charter and minimum standards for disaster response. The aim of the Sphere standards is "to improve the quality of assistance to people affected by disaster and improve the accountability of states and humanitarian agencies to their constituents, donors and the affected populations." The standards are based on two core principles, "first, that all possible steps should be taken to alleviate human suffering arising out of calamity and conflict, and second, that those affected by disaster have a right to life with dignity and therefore a right to assistance." The standards, however, do not reference the vital role that information and access to information play in disaster response, even though access to information is considered as important as access to food, water and shelter.[6] Disaster-affected communities are entitled to information. Studies of the disaster response to the 2004 tsunami have shown that information plays an important psychological role that can alleviate human suffering.[7] In sum, however, there are no standards governing the use of information and communication technologies in disaster response.

The precedent set by the use of SMS in Haiti suggests that future disaster response operations will see more and more organizations setting up free and open source communication and crisis mapping platforms. This poses an important coordination challenge. The widespread application of these tools may also have negative impacts when communicating with disaster-affected communities. This was already apparent in Haiti even though there were relatively few individuals involved in setting up the SMS system, hence the pressing need for an SMS Code of Conduct for Disaster Response. This code must uphold the humanitarian principle of "do no harm." To this end, the development of such standards should be the responsibility of the humanitarian community. However, as we have seen in Haiti, the United Nations took weeks to respond while the technology community took hours.[8] This is a classic case of technology and innovation leading regulation. We therefore propose the following for consideration and feedback. The standards below are not meant to be exhaustive and only serve to catalyze a discussion that needs to happen sooner rather than later. In addition, the following standards are not independent of existing standards such as the Sphere project.

- The humanitarian imperative comes first. SMS-based services (and similar communication projects) should have this as their primary goal.
- Crowdsourcing platforms should be utilized to take advantage of the "local" knowledge of the crisis-affected regions. This applies to both linguistic and geographic knowledge. While every crisis will be different, it is always the case that the emergency responders possess a subset of all information about a crisis-affected region. For the large numbers of people who possess the knowledge to plug those gaps, crowdsourcing provides them with a means to contribute structured data to unstructured SMS in real-time.
- SMS information services for disaster affected populations need to be "opt-in" services. Organizations should not carry out regular broadcast SMS messages without giving recipients the ability to unsubscribe to the service.
- Information communicated to disaster-affected populations via SMS needs to be relevant, actionable and timely. This means that SMS messages should be targeted by geography and if possible by group. For example, displaced individuals in an internally displaced persons (IDP) camp in Haiti should receive information that is relevant to their situation and their location.
- SMS platforms should ideally be set up prior to major disasters. Either way, however, these systems should be highly robust and reliable. Backup systems should always be available should the primary system crash, making it optimal that professional organizations host the servers and critical network connections.
- Time-critical communications (like emergency response requests) should be a separate channel to more general information services, and ideally through a separate short code.
- The number of short codes should be limited; otherwise this will cause unnecessary confusion. One short code should be dedicated to sending out SMS messages, while a separate short code should be used to receive SMS messages from disaster-affected communities, but many more could lead to confusion. In order to keep the number of short codes limited, short codes should be shared by multiple groups. Sharing requires that

groups coordinate with each other. Each group should submit its desired text messages to a coordinating body, such as the Communicating with Disaster Affected Communities (CDAC) group. The latter would ensure that text messages are not duplicated or contradictory, and that any parallel services do not interrupt the operations of the other.

- Disseminating information about the short codes should be clear and simple. While it is not necessary that only one source provide the messaging, it is critical that the different sources disseminating this information provide consistent messaging about the short codes and their uses. Along these lines, it is also critical that the messaging not raise false expectations. The dissemination should use multiple channels including radio, newspaper, television, and bulletin boards. The messaging about short codes should also clearly identify who is sending and/or receiving the message, and for how long the service will be in place.
- Utilize professional companies for hosting network connections, ideally ones with existing connections to the local telecommunication companies. Just as few NGOs host their own servers today, for reasons of scalability and monitoring, it is no longer an optimal architecture for an NGO to host low-level network connections.
- Requests for short codes should be done in a coordinated and professional manner. CDAC should act as the coordinating body for such requests.

If short codes are not available, long codes should be used and the use of these should follow the guidelines outlined above.

Notes

[1] The authors would like to thank Jaroslav Valuch, Roz Sewell, and Nona Lambert from the Fletcher team for their invaluable feedback during the drafting of this paper.

[2] Hillary Clinton, "Remarks on Internet Freedom," January 21, 2010, The Newseum, *http://www.state.gov/secretary/rm/2010/01/135519.htm*.

[3] Ibid.

[4] Craig Fugate, "Crisis Map of Haiti," Twitter.com, January 22, 2010.

[5] These are available at: OSM: http://www.openstreetmap.org, Sahana: *http://www.sahanafoundation.org*, and Hypercube: *http://hypercube.telascience.org/haiti/*, respectively.

[6] BBC World News Trust, "Left in the Dark: The Unmet Need for Information in Emergency Response," http://www.bbc.co.uk/worldservice/trust/news/2008/10/081022_emergency_response_briefing.shtml.

[7] Patrick Meier, "Haiti and the Tyranny of Technology," iRevolution, March 2, 2010.

[8] Colum Lynch, "Top U.N. Aid Official Critiques Haiti Aid Efforts in Confidential Email," *Foreign Policy*, February 17, 2010.