

The Neo-Humanitarians:
Assessing the Credibility of Organized Volunteer Crisis Mappers

By

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Abstract

In the past decade humanitarian crises have been occurring with increasing frequency. As of 2013 the United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA) is involved in 27 countries, monitoring the response to natural disasters or violent conflict (Where we work n.d.). Over the same period the internet has seen a deluge of new, interactive website and tools. Social media sites that allow users to share their own content with a digital community have led to an explosion of user-generated content online. Meanwhile, internet-based mapping tools, such as Google Maps, make it easy for almost anyone to make maps online. These developments converge in the form of a recent trend: volunteer crisis mapping. Since 2008 individuals have started making maps and collecting spatial data related to humanitarian crises –both violent conflicts and natural disasters. While the role of social media and web-mapping in humanitarian responses has been praised for creating a participatory space in humanitarian responses, the people volunteering to do the crisis mapping remain largely unexplored. Drawing from the neogeography literature which explores the impact amateur mappers in general, this paper seeks to define who the volunteer crisis mappers are, and how they are forming institutional connections to the ‘formal’ humanitarian sector.

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Keywords: crisis mapping, neogeography, humanitarian response, credibility

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INTRODUCTION

In January 2010, an earthquake with a magnitude of 7.0 struck Haiti. Foreign governments, international humanitarian agencies, NGOs, and foreign governments, rushed to aid the Haitian government and local people, but to do their work, even to get started, these actors needed information – maps of the affected areas, assessments of building damage, and names of missing people. Yet, comprehensive maps and many other records did not exist or were lost in the wreckage. In addition, the local government was incapable of managing the relief efforts due to weak leadership, disorganization and the physical loss of most of the infrastructure in the capital. In the words of one UN spokeswoman, it was “a logistical nightmare” (‘Logistical nightmare’ to get help to victims 2010). Out of this chaos two independent, volunteer-led responses emerged to fill the spatial information gaps: Humanitarian OpenStreetMap (HOT) and the Ushahidi Haiti Project.

OpenStreetMap (OSM) is an open-source, online mapping platform that allows volunteers to upload GPS data and trace elements from satellite images to contribute to a crowdsourced online map of the world (like a combination of Wikipedia and Google Maps). The Humanitarian OpenStreetMap Team (HOT) is an off-shoot volunteer organization that applies the OSM platform to improve map data for humanitarian situations. In Haiti, HOT remote volunteers took high resolution satellite images of the damage and traced over roads and buildings to create a detailed, up to date map for humanitarian responders (Zook, et al. 2010). Figure 1 shows the incredible amount of detail added to the OSM map of Port-au-Prince, Haiti by the HOT volunteers (Maron 2010).

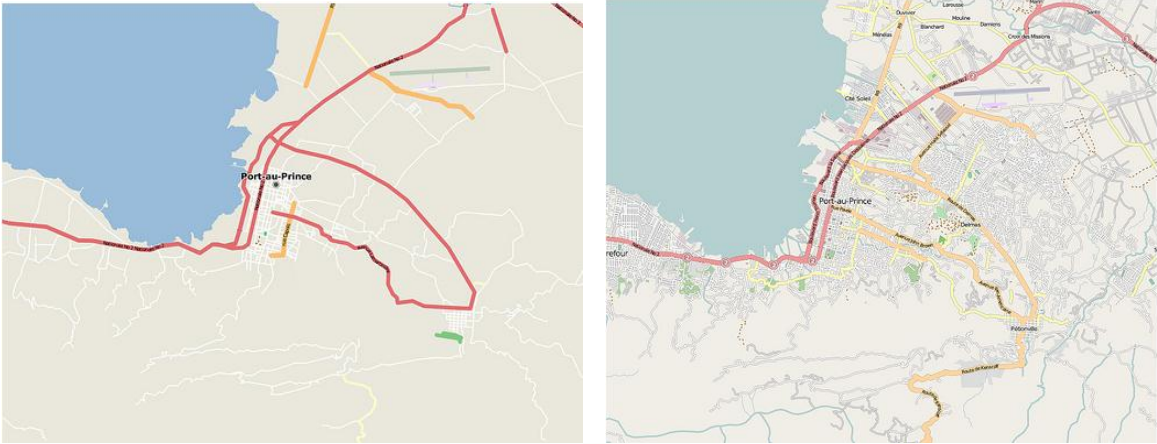


Figure 1 OSM Haiti Before (left) & After (right) HOT Mapping

Ushahidi is an online crowdsourced mapping platform that allows many people to submit reports via SMS or email. Once the information is verified, categorized, and geotagged, it is added to an online map. The Ushahidi Haiti project was started by a group of graduate students at Tufts University, organized by Patrick Meier, then the Director of Crisis Mapping at Ushahidi and also a Ph.D. student at the Fletcher School at Tufts. The team of students used the Ushahidi platform to map information coming from affected communities in Haiti via social media. The result was a simple, interactive web map that showed nearly real-time visualizations of calls for assistance in Haiti (Morrow, et al. 2011).

These projects are two examples of volunteer **crisis mapping**, a phenomenon driven by recent technological advances, online communities and volunteerism. They are notable for several factors: they were organized and fueled by volunteers using an open, collaborative production model; they provided information that was not otherwise available to humanitarian actors in a very short period of time; and they applied very recent developments in online mapping technologies.

According to CrisisMappers.net, the online portal for the crisis mapping community:

Crisis mappers leverage mobile & web-based applications, participatory maps & crowdsourced event data, aerial & satellite imagery, geospatial platforms, advanced visualization, live simulation, and computational & statistical models to power effective early warning for rapid response to complex humanitarian emergencies. As information scientists we also attempt to extract meaning from mass volumes of real-time data exhaust. (Crisis Mappers 2013)

The world of crisis mapping is quite diverse – encompassing professional crisis mappers (such as the United Nations’ Operations Satellite Applications Programme, UNOSAT, which uses satellite imagery to monitor humanitarian crises), academic crisis mappers (like the researchers at the Peace Research Institute Oslo who study conflicts using geospatial datasets), and volunteer crisis mappers (both organized and ad-hoc). This paper will focus on organized volunteer crisis mappers because their growth has been the most notable and their institutional role in humanitarian response is still evolving. These volunteers have created a new space in the relatively closed and specialized field of humanitarian response work. In a way, the volunteers are an ‘informal’ humanitarian work force as compared to the ‘formal’ humanitarian actors like the United Nations, the Red Cross, and other NGOs.

The innovation of volunteer crisis mapping projects is indisputable, but their impact is more difficult to define. In the two examples above, both were data collection missions yet they were not initiated by any of the ‘formal’ humanitarian actors present in Haiti (like the UN, the Red Cross, USAID, etc.). So, the actors in the field whom these projects intended to help were not immediately aware of these new information sources. Furthermore, when they did become aware of them, humanitarian actors did not know if they could trust these new information sources because they were produced by remote volunteers, a new and unknown labor source (Morrow, et al. 2011). Additionally, the local population engaged by these projects expected a response in return for their participation, but responses were rare and inconsistent due to the lack of project ownership among actors on the ground (Morrow, et al. 2011). Thus, the impact of such projects is dependent on the institutional connections and personal credibility of volunteer crisis mappers.

In order to assess the impact of this new trend of crisis mapping, this paper will explore these two criteria of the institutional linkages and credibility – of organized volunteer crisis mappers. First it will look at the development of linkages between the ‘formal’ humanitarian actors and volunteer crisis mappers, by looking at several crises in the past decade. Then it will look at the volunteer themselves and attempt to answer some questions relevant to their credibility as sources, namely their professional experience, motivation, and possible biases. Finally, it will analyze the volunteer crisis mapping organization, an important unit of analysis that has been previously overlooked in the literature, and assess how these organizations affect both the credibility of their volunteers and the institutional linkages with ‘formal’ actors.

LITERATURE REVIEW

Crisis mapping is celebrated for engaging new players, particularly the public, and collecting and producing new kinds of data. However, these contributions are not unique to crisis mapping. Digital mapping technologies have been used as a form of public engagement since the mid-1990's. Similarly, the challenges of data collection, analysis and management in humanitarian situations are not new or unique to the work of volunteer crisis mappers. This chapter will summarize the findings from the literature of these two existing fields and draw out the themes that will be useful in analyzing the volunteer crisis mappers and their institutional connections to humanitarian actors.

The Evolution of Engagement: From PPGIS to Neogeography

New technologies – be they GIS or webmapping – can offer a seemingly new approach to engaging communities in decision making. However, certain challenges to truly inclusive engagement are a recurring. In addition, if the new technologies and their sources do not have credibility in the eyes of decision makers, then the “engagement” has little effect on the actual decision making.

PPGIS

The idea of using digital mapping to engage average citizens was first put forward in the public participation GIS (PPGIS) literature in the 1990's in response to the critiques of the GIS and Society literature. The GIS and Society literature argued that maps and GIS were instruments of “power-knowledge” that maintained and at times exacerbated existing political, social and cultural power imbalances (Crampton 2001). In response, GIScientists and practitioners worked to prove that GIS did not need to be a positivist tool of “top down” planning and monitoring. They presented GIS as a tool to leverage citizen participation in policymaking and empower marginalized groups by giving them the same tools of knowledge production. Approaches varied from those that focused on creating an inclusive process with more effort at engaging stakeholders and making the technology approachable (Sieber 2006), to those that dealt with changing the software itself to make it more inclusive to qualitative forms of data (Kwan 2002). However, despite innovative applications of GIS software and partnerships with local communities and grassroots NGOs, barriers persisted. The digital divide prevented the poorest members of society from accessing these tools of engagement, and powerful groups were able to coopt participatory processes to their advantage (Elwood 2006).

Web 2.0

In the early of the 21st century several technological advances seemed to present a solution to the challenges PPGIS faced. Called Web 2.0, these technologies include interactive websites and digital platforms like social media sites (facebook, Twitter, Flickr), user-generated web content (blogs, wikis, etc.), collaborative suites (Google Documents), and crowdsourced resources (Wikipedia, Yelp). Web 2.0 technologies blurred the line between the user and the producer of digital information, creating the user-producer by empowering participants with the tools to create their own data (O'Reilly 2005). The user-producer model presented a demand-driven participation model – if people were interested they would participate (Flanagin and Metzger 2008). However, the previous concerns of PPGIS, the digital divide and cooptation by more powerful groups, persisted. Even when the tools are provided there is a skills gap that disadvantages those with the least exposure and access to technology (Johnson and Sieber 2012).

Nevertheless, many government agencies and other public organizations tasked with community engagement have turned to various forms of Web 2.0 to meet their participatory goals, spawning the term Gov 2.0 (Johnson and Sieber 2012). On the positive side, Gov 2.0 poses the possibility of financial savings, efficiency and – seemingly – government transparency. Rather than simply exposing government operations through open data, feedback systems create the sense of being heard. However, when feedback mechanisms are not attached to a means for action, this feeling of being heard is meaningless. Gov 2.0 can *look like* government accountability, but if there is little internal impetus to truly respond to or act on comments from the citizenry, the relationship becomes one-way (Elwood 2007).

Thus, Web 2.0 technologies created a user-producer with a more active role in the creation and use of online content, but, without true buy-in from the existing institutions these new technologies recreate the old pitfalls of participation.

Volunteered Geographic Information

Much of the user-generated content produced by Web 2.0 technologies contains geographic data. Michael Goodchild coined the term volunteered geographic information (VGI) to describe user-generated online content that contains geographic information (Goodchild 2009). Examples of VGI include tweets (using Twitter), facebook posts, and images uploaded to Flickr. Although VGI presents rich, large datasets, it also raises several concerns about the reliability of the data, and the privacy and consent of the authors (Flanagin and Metzger 2008). Data reliability is impacted by the sheer size of data and the fact that it is coming from so many sources at once. With so many separate authors it is more difficult to find false reports. Crowdsourced projects like Wikipedia have shown that typically the false reports or errors are grossly outweighed by the accurate information to the extent that the dataset as a whole is not corrupted. However, the effective anonymity of the crowd can create an opening for malicious intentions (Friedland 2010), as in Syria where an oppressive government used the anonymity of a social media platform (Twitter) to present incorrect information to incite violence or other destructive behavior (Perlroth 2013).

Although, by definition, VGI is “volunteered” it still raises concerns about the informed consent of the author. It could be argued that users creating content are not giving *informed* consent to have their data mined because they do not know or understand all of the uses for which such data could be used (Elwood 2007). In particular, users may not even realize that their data has a geographic component, since it is often not the primary purpose (Flanagin and Metzger 2008). Privacy is another similar concern. Again, users of public sites, like facebook, may not realize how accessible all of their information is. And, because social media accounts are linked to personal information it is possible to trace them back to individuals. Breaching privacy is a problem for research ethics, but it can also put subjects at risk. In several cases, user information from facebook and Twitter has been used by repressive regimes to track down political dissidents. Spatializing data can also lead to other kinds of invasions of privacy. Releasing the locations of humanitarian actors on the ground can put them in danger. For example, Al Qaeda forces attacked a Red Cross station in Pakistan during relief efforts from the floods in 2005 (Reidenberg 2013).

Finally, as with any other technologically based information, VGI is biased towards those who have access to the internet, devices to access the internet, and to a lesser degree, those who speak English or another globally dominant language (Goodchild 2007) (Zook and Graham 2007). So,

when using VGI one must remember that it is not descriptive of everyone, just everyone able to contribute data.

Neogeography

In 2005, the release of Google's application programming interface (API) transformed online mapping capabilities by making the base data available to anyone with basic programming skills. With the API, Google maps could be easily embedded into other websites or added as a base to other layers of information. Similarly, advances in open-source technology made customizable mapping products accessible and free. One such example, OpenStreetMap (OSM) is an open-source online mapping tool that makes free online maps available and is maintained by users (similar to Wikipedia). Another example is Quantum GIS, a free, open source version of ArcMap (a GIS program). By lowering the financial and technical barriers, these developments enabled almost anyone with an internet connection to make and share maps, and by extension giving reason for a new field in geography to focus on all of the new, map makers: neogeography.

Professional geographers are trained to maintain certain practices and standards of data – including protecting the privacy and anonymity of sources. However, these new technologies make it possible for nearly anyone to make a map, and the neogeography literature assumes that “anyone” is an amateur (Goodchild 2007), and thus lacking the knowledge of these standards and good practices. As Goodchild (2009) explains, “Terms such as *professional* convey an immediate sense of care, attention to detail and adherence to rigorously applied standards, whereas the very term *amateur* suggests poor quality and is even used pejoratively.” Flanagin and Metzger (2008) go farther, posing the possibility that these people providing geographic data “are not trained or even necessarily interested in geography as a science” (emphasis added).

The Role of Data in Humanitarian Response

There are several characteristics that make humanitarian crises, both natural disasters and violent conflicts, uniquely challenging situations. They result in large numbers of displaced or missing people that need at least food, water, shelter, and medical care. Existing infrastructure such as roads, electricity, water pipes, telecommunications and internet infrastructure are often damaged and temporarily out of order, if not destroyed. The response to such crises happens as quickly as possible, with many actors from international agencies (the UN), NGOs (the Red Cross), foreign governmental agencies (USAID), private companies, and the general public stepping in to do what they can. Because of these challenges, the seemingly simple tasks of coordinating activities and using and sharing data become complex and require (at least until the advent of volunteer crisis mappers) expert handling.

Coordination of Actors and Data Sources

Humanitarian crises are chaotic, in part because of all of the actors who get involved in the response. In a humanitarian situation there are six categories of actors who could become involved. On the local level there is the local government, local NGOs, and the local affected population. From the international scale, come the international NGOs, such as the International Federation of the Red Cross and Crescent (IFRC); bodies of the UN, such as UN Office for the Coordination of Humanitarian Affairs (UN OCHA), UNICEF, and the World Food Programme (WFP); and humanitarian arms of foreign governments which are often supported by their own military, like USAID and AusAID (Australia).

Coordinating response work between all of these groups is difficult because although they are united in responding to a crisis, they have different mandates and funding sources which translate

into different priorities (Laituri and Kodrich 2005). To deal with this, UN OCHA acts as the coordinator for all the other actors. The cluster system, a management framework put in place by OCHA to organize actors (including UN bodies) by their area of focus (food, shelter, logistics, etc.) in a particular crisis, organizes which groups are responsible for certain tasks in the response effort. Also, ReliefWeb, an online clearinghouse managed by the UN makes available information related to ongoing humanitarian missions, collects all of the data that different actors are producing as they work and makes it available to all actors (UN OCHA 2012).

Like the range of actors, information during a crisis comes from multiple sources. There are three basic types of information needed. Baseline data establishes the 'before' situation, which includes existing infrastructure, population data, land cover and satellite images. Rapid assessment data is collected in the immediate aftermath from field surveys and includes information such as the numbers and locations of displaced people, damage to buildings and infrastructure, and public health indicators. Remote sensing, such as satellite imagery or light detection and ranging (LIDAR) imagery, can also track the 'after' using high resolution satellite images to detect damage.

Depending on the situation this data can come from different actors. For example, if the local government is not greatly incapacitated by the disaster it may be able to supply most of the existing data. Or, if there is already a presence of international NGOs or the UN they will already have a lot of the existing data. These actors that are already in the field are well positioned to do the rapid assessment after the crisis hits, but they are also susceptible to being impacted by the crisis and thus incapacitated. For example, when the earthquake struck Haiti, it destroyed much of the UN's base. So, instead of being able to deliver baseline data and help setup the rapid response, the UN workers already in Haiti were just as incapacitated as the local government. In these cases, the rapid assessment is delayed while new teams arrive and get into place. Private companies can also be useful partners for gathering data during a crisis. Under the International Charter on Space and Major Disasters all signatories, which include private satellite companies and national space missions of many countries, must release relevant images after a crisis, so often there is a lot of imagery available (International Charter on Space and Major Disasters 2013).

For new actors, understanding this landscape of actors is the first challenge to participating in humanitarian response work. The next step is getting space in the chain of information collection and analysis. The next chapter looks specifically at how volunteer crisis mapping projects have slowly made a place for themselves on the inside of this closed-circle of information production.

Data Management & Decision Making

With all of these actors working together and separately, a lot of information is collected in a short amount of time, leading to challenges in the application and management of data. In a recent study, "The Use of Evidence in Humanitarian Decision Making," Darcy et al (2013) find that not all data is necessarily used for making decisions. Humanitarian workers often refer to "data overload" when they have more data than they have time to process. So, for the sake of expediency, organizations can become "path dependent" in their use of data in decision making. In other words, actors find it easier to make decisions based on the traditional data they are able to collect, rather than incorporating data from new sources or other organizations. Similarly, actors will often settle for "good enough" data because of the high stakes and short timeframe for making decisions. Effectively, they decide that the human cost of taking more time to be more accurate or correct would be higher than the cost of using the data at the "good enough" stage (Darcy, et al. 2013) (Zook, et al. 2010).

New data sources and formats can further complicate this situation. Institutional preference or partnerships may require the use of a particular format or platform that is incompatible with others. For example, in Haiti, some field workers started using Google Maps to keep track of conditions such as road closures. This information would have been useful merged with the OpenStreetMap map of Haiti, but because Google is proprietary software and OSM is open-source, the two datasets were incompatible (Zook, et al. 2010). Thus, getting new kinds of data to actors in a way that they will actually use it is an uphill battle, even from within the institutional setting.

Crisis mapping volunteers pose a unique challenge because they are – at least in concept – amateur mappers, as described in the neogeography literature, but they are also the actors making the most use of the latest kinds of tools and data in a humanitarian application. Thus, they are the neo-humanitarians – a new, web-enabled work force that operates outside of the professional, ‘formal’ sector.

THE DEVELOPMENT OF LINKAGES WITH THE 'FORMAL' HUMANITARIAN SECTOR

The 2010 earthquake in Haiti was a watershed moment for the development of volunteer crisis-mapping efforts. However to understand the complete transformation that is taking place between these organized volunteers and the 'formal' humanitarian sector, it is necessary to start before Haiti. This section will analyze the humanitarian responses to several humanitarian crises to illustrate the shift towards more formally incorporating volunteer crisis mappers.

Early Applications: Local volunteers and an engaged digital public

Before Twitter, facebook, and Google Maps, mapping and geospatial technology still played a key role in crisis responses. Without the Web 2.0 platforms to make volunteering accessible to anyone with an internet connection, individuals volunteered in any way they could, whether donating their time and skills in person, or giving financial support remotely.

September 11 (2001)

After the attacks on the World Trade Center in New York City, on September 11, 2001, nearby data and mapping experts sprang into action to help the response teams make sense of what had happened. Because this was one of the first times that GIS and remote sensing data had been used for such a situation, there was no protocol. So, instead ad-hoc groups organized themselves based on experience and access to data. GIS professionals worked as volunteers out of the designated Emergency Mapping and Data Center at Pier 92 (Kawasaki, Berman and Guan 2013).

The South Asian Tsunami (2004)

On December 26, 2004, an offshore earthquake caused a gigantic tsunami in the Indian Ocean. 22 countries were hit and the death toll was estimated at more than 200,000 people (Underwood 2010). The relief effort was led by the UN, and several of the affected countries and the U.S. (Margesson 2005). With such a geographically large scope of damage satellite imagery proved essential to the response. High-resolution images showing the affected areas before and after the tsunami were donated by private satellites and software companies (Laituri and Kodrich 2005).

From the perspective of the global public, media coverage garnered a lot of attention that resulted in this being one of the first disasters that raised a significant amount of financial contributions through online pledges (Laituri and Kodrich 2005).

The Transition: Ad hoc volunteer web-mapping of disaster affected populations

With the arrival of Google Maps in 2005, online mapping capabilities dramatically shifted, making space for ad hoc volunteer mapping efforts.

Hurricane Katrina (2005)

When Hurricane Katrina hit southern Louisiana and Mississippi, it flooded roads and buildings, leaving many people stranded, often without enough food and water and limited communications access. The perceived failure of the FEMA response to meet these dispersed needs quickly, caused many individuals to take up the response effort themselves, via the internet. They created websites with message boards for missing people to connect with concerned families and friends, lists of active relief centers and supplies that they needed, and maps – maps of people, damaged infrastructure, and the relief effort (Laituri and Kodrich 2005). Scipionus.com was a Google map

that showed missing people, damaged buildings, and floodlines. It was set up by two software engineers, but the information was added in a crowdsourced manner with anyone able to add to the map (Laituri and Kodrich 2005) (Roche, Propeck-Zimmermann and Mericskay 2013). Google Earth also updated its imagery with images showing the damage from the storm (Kawasaki, Berman and Guan 2013). And, the newly formed GIS Corps sent volunteer GIS professionals to assist on-site with geospatial needs of responders.

Haitian Earthquake (2010)

Haiti was a different story. Google Maps and Google Earth were popular and well known by 2010. Mashups using Google Maps and other data (like Scipionus.com) were by now a familiar concept. Ushahidi, the SMS-based crowdsourcing map platform, had presented another version of a web-map, significant in its simplicity and efficacy in tracking election violence in Kenya in 2008. So, this was the turning point for both the involvement of the digital public and the role of the local voices. Thus it is not a surprise that these technologies pioneered in earlier crises were quickly deployed when traditional means of collecting and managing data could not keep up with the needs of the ground relief efforts in Haiti.

The Humanitarian OpenStreetMap team (HOT) and the Ushahidi Haiti projects, were just two of many responses to the need for geospatial data. The Harvard University's Center for Geographic Analysis uploaded high resolution satellite images formatted for immediate printing to resolve the lack of paper maps on the ground in Haiti (Kawasaki, Berman and Guan 2013). CrisisCamps, meetings of members of CrisisCommons, a network of NGOs, individuals, private companies and government agencies united around providing better technology for disaster responses, sprung up all over the U.S. and eventually across the world. The purpose of these meetings was to create better tools for geographic data collection and analysis to be used on the ground in Haiti (Zook, et al. 2010). Finally, a partnership between a Haitian mobile phone provider and several NGOs resulted in a "shortcode" to which people in Haiti could text reports of need (Clemenzo 2011).

However, despite the deluge of good intentions, Haiti was also a prime example of "data overload." With so many unconventional actors getting involved in the processes of collecting, producing, and analyzing data actors on the ground in Haiti were challenged to know where to start (Nelson, Sigal and Zambrano 2010). As mentioned earlier, one of the problems with this lack of coordination was incompatible platforms that could not be combined. Another was the lack of a consistent response mechanism for engaged local communities. In the case of the shortcode project, these reports were added to the Ushahidi Haiti map, but with so many involved partners there was no one directly responsible for responding to these reports. So, while local people expected immediate action to come from their reports, most of the data was just used to help target concentrations of need or triangulate other data sources (Clemenzo 2011) (Morrow, et al. 2011).

Today: An integrated role for volunteer crisis mappers

In response to the lessons learned in Haiti, several shifts to the crisis mapping environment are visible. Most evident is the creation of the Standby Task Force (SBTF) in late 2010. Also, the UN's immediate partnership with the SBTF to do a training on Ushahidi deployment in an emergency situation indicates the UN's recognition of an important emergent technology (Meier 2011). Finally, the creation of the Digital Humanitarian Network (DHN), a network of volunteer crisis mapping organizations and other volunteer and technical communities, in the Fall of 2012, indicates a more permanent shift towards making a unified place for these volunteers in the 'formal' humanitarian response environment.

The Philippines' Typhoon Pablo (2012)

Within a day of Typhoon Pablo hitting the Philippines (on December 3rd, 2012), UN OCHA reached out to the Digital Humanitarian Network for support. The UN wanted to analyze the past three days of Twitter activity in the Philippines as one means of assessing the damage from the storm. Two volunteer crisis mapping organizations responded to the mission – the Standby Task Force and Humanity Road. Within 12 hours the two groups had jointly completed the task, producing a spatial dataset with 138 “highly annotated” data points (Meier 2012). UN OCHA used the dataset to create a map of conditions immediately following the storm (see Figure 2). This map was shared internally at UN OCHA, as well as with other humanitarian actors and the government of the Philippines.¹

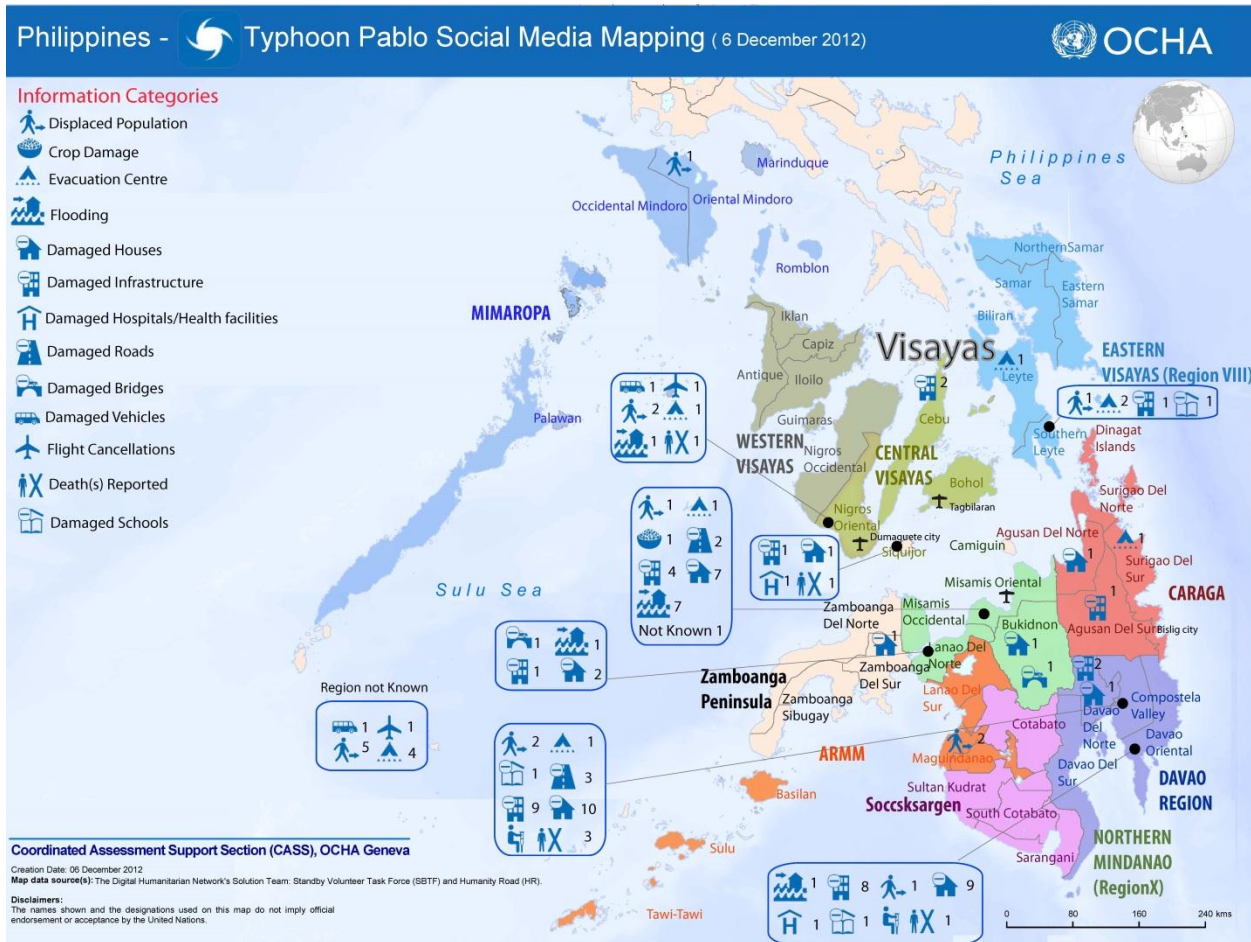


Figure 2 "Philippines - Typhoon Pablo Social Media Mapping" (UN OCHA)

This was the UN’s first crisis map that relied solely on social media data. By using the DHN, UN OCHA was able to reach out to two volunteer groups at once and establish the project criteria in a way that would be most useful to OCHA operations.²

¹ Patrick Meier, email correspondence with author, May 21, 2013.

² Ibid.

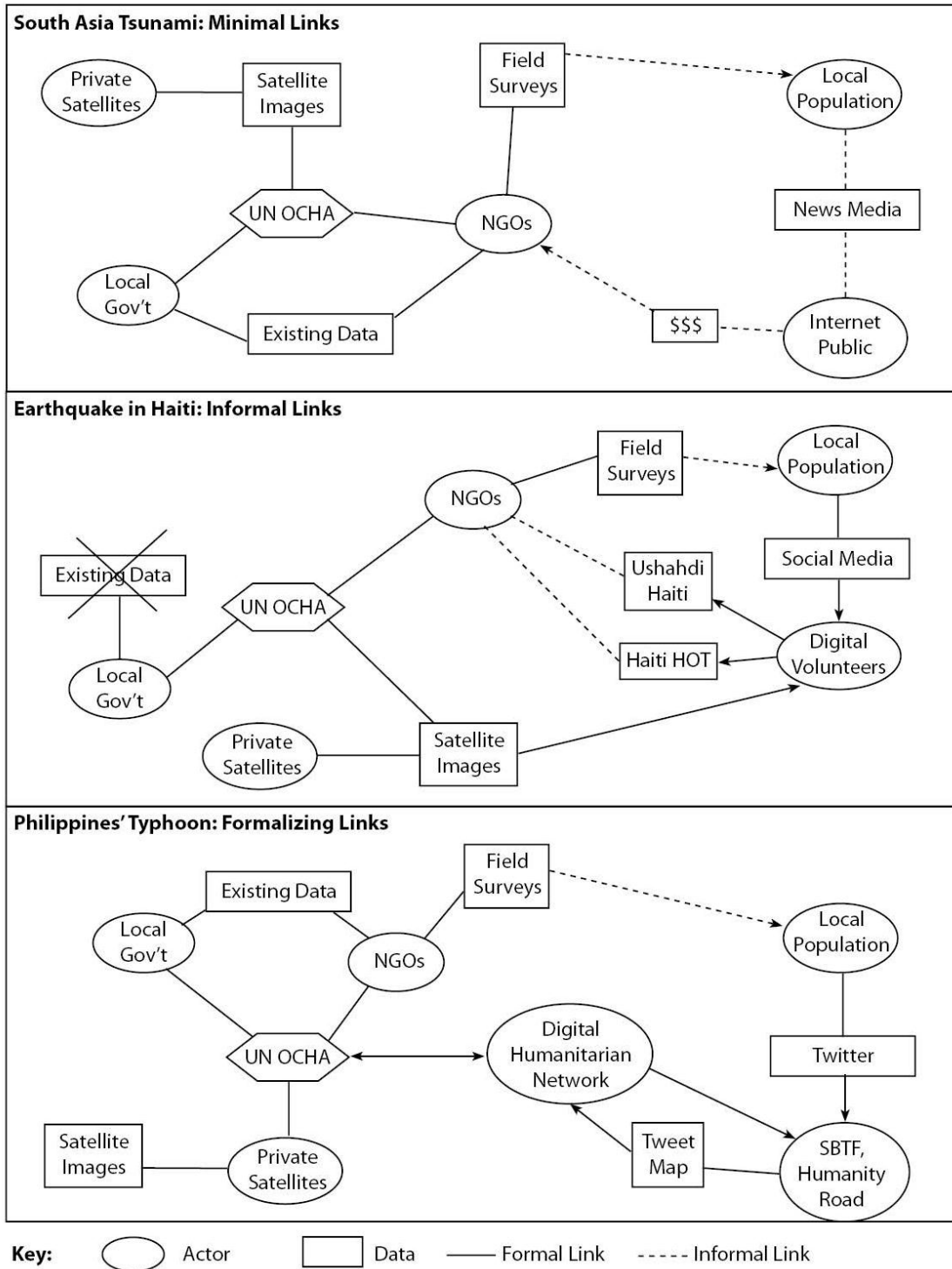


Figure 3 Diagram of Developing Linkages

The diagram in Figure 3 shows the shifting linkages between the volunteer crisis mapping community and the ‘formal’ humanitarian sector. Using an example from each of the three sections above it illustrates a simplified view of the institutional arrangements between UN OCHA, other actors of the ‘formal’ sector (NGOs, local government), and the two publics – local and global (called the “internet public” because this public only refers to those connected digitally

to these disasters). In the first phase, there are some tenuous, informal connections between these two groups in the form of field surveys, which engage a selection of the local population, and online financial contributions, a passive means of engagement with the internet public. In the second phase (exemplified by the Haitian earthquake), social media and digital volunteerism has enabled some deeper engagement with the publics, but the use of these products by the 'formal' sector is still inconsistent and tenuous. Finally, in the third phase the intervention of the Digital Humanitarian Network acts as a formal link between crisis mapping volunteers and the UN. This relationship works in terms of requesting and receiving the data, making a formal linkage that goes back to include the local population creating tweets.

These connections are still forming and strengthening, so this diagram should be seen as a three moments captured of a still-moving process. At this point, however, it is quite significant to note that formal connections have been made, giving a significance to the work of these volunteer crisis mappers now that their products are being formally received and used.

WHO ARE THE VOLUNTEERS?

As volunteer crisis mappers become increasingly connected to the ‘formal’ humanitarian actors the question of their credibility as sources becomes increasingly relevant. As Flanagin and Metzger (2008) explain, the credibility of a source is dependent on two things: trustworthiness and expertise. Institutional connections to ‘formal’ actors within the field of humanitarian response indicates some acceptance of these volunteer crisis mappers’ credibility, and the institutional roles of the organizations will be explored in the next chapter, but the identity of the volunteers themselves is still a crucial, and currently overlooked, element to their overall credibility. This chapter presents results from an online survey of crisis mapping volunteers, conducted by the author. The survey questions focused on several areas of the volunteers’ background and their personal and professional experiences in an effort to determine whether volunteers make credible sources.

The significant survey findings fall into three categories – the volunteers’ professional backgrounds, their motivations, and their geographic experience. By the nature of the fact that they are volunteers, volunteer crisis mappers are often assumed to be amateurs. The neogeography literature discussed in the second chapter raises several concerns related to amateur mappers. First, there is concern about the reliability of the data they produce. Then, in a broader sense, there is concern about amateur mappers not having professional guidelines to inform their behavior.

The motivations of amateur mappers are also often suspect (Flanagin and Metzger 2008). Because it is so easy to make maps online, there is concern that these map makers are not interested in the deeper, academic side of mapping, and are instead just participants in a trend. In the case of volunteer crisis mappers this is even more worrisome because humanitarian crises are actual life-or-death situations and a casual participant may not consider the ramifications of errors or low work standards.

Finally, geographic experience, a term that covers both where a volunteer is from (his or her nationality) and where s/he has lived or traveled, is another crucial detail for such a simultaneously global and remotely based phenomenon. It addresses the possibility of a geographic bias of volunteers. Also, personal experience in a relevant country or region can translate to existing social networks in that region as a source for information, familiarity with local knowledge (ie. how an address is described), or knowledge of local languages.

The Survey

I administered the online survey to the crisis mapping community via several methods. I emailed some of my interview contacts³ the link and asked them to pass it on through their networks. One contact, Shoreh Elhami of GIS Corps, sent the survey link out to the entire GIS Corps listserv. At the suggestion of another interview subject⁴ I posted a link to the survey with a brief description of my project on the online posting sites for CrisisMappers.net and the Standby Task Force. I also hosted the survey on my personal MIT webpage with some background information about me

³ Shoreh Elhami at GIS Corps, and two volunteer crisis mappers, Max Richman and Robert Banick.

⁴ Anahi Ayala Iacucci of the Standby Task Force

and my thesis. However, this website was not considered a primary means of contact; rather, it served to give the survey some context to those finding it through a second hand relation to me. A copy of the survey is included in the appendix.

In two months (January and February 2013), 81 people responded to the survey. The respondents are a diverse group based on age, gender, nationality and educational experience. 21 different nationalities are represented in the 81 responses, a full range of ages from under 22 to over 50, and every level of educational achievement. Respondents listed affiliation with several crisis mapping organizations – the GIS Corps, the Standby Task Force, Crisis Commons, Humanitarian OpenStreetMap – and several other NGOs or local organizations, like the Peace Corps, Statistics without Borders, and HumaniNet.

Potential Bias

Because of the distribution methods the survey sample is skewed towards the GIS Corps and the Standby Task Force. Plus, perhaps because the GIS Corps members were the only group to receive the survey in an email from a leader of the organization, an overwhelming majority of the responses indicate some affiliation with the GIS Corps. Of the 81 responses, 56 (69%) indicate GIS Corps as the first organization they volunteer worked with, and 61 (75%) indicate at least some affiliation with the GIS Corps. This skew is particularly relevant for the findings related to volunteer professional backgrounds because the GIS Corps is an organization with strong ties to GIS professionals and professional associations.

This survey was intended to be exploratory, and so the results are not supposed to be statistically significant. The sample size, 81, is small compared to the number of registered volunteers with these two groups; the GIS Corp and the Standby Task Force have roughly 3,000 and 900 members respectively. Although, the survey indicates that there is some overlap in membership between the two.

Finally, with an anonymous survey, it is possible that responses are purposely misleading. However, since respondents have nothing to gain from misrepresenting themselves, this seems unlikely.

Professional Background

The Web 2.0 and neogeography literature raises concerns regarding the increasing role of amateur mappers creating maps online. Professional geographers are trained to uphold certain standards and best practices in terms of choosing data, analyzing it and displaying it. Because these mappers are not trained geographers, the literature argues, they are not upholding these standards and yet the maps they produce may not be easily distinguishable to the general public due to the accessibility of GeoWeb tools. Misinformation as a result of an incorrectly presented map is all the more concerning in the context of humanitarian operations, where the map may be the single piece of information on which relief administration or other dire decisions are made. Thus, the skills and professional background of crisis-mapping volunteers are central to understanding the impact they have on humanitarian operations.

In contrast to the assumption that volunteers are predominantly amateurs, the vast majority of survey respondents (85%) indicated that they worked in a field related to crisis mapping. Of these positive responses, 87% indicated that they worked in a field related to “GIS/Mapping.” The other responses indicated experience in “Statistics/Data Analysis” (6%), “Humanitarian Work” (4%) and “International Development/Aid” (2%) (see Figure 4. Besides indicating a level of professional

training that is relevant to their crisis mapping work, these results also suggest that crisis mappers come from fields with relevant codes of conduct to guide their mapping decisions, even while they doing volunteer work.

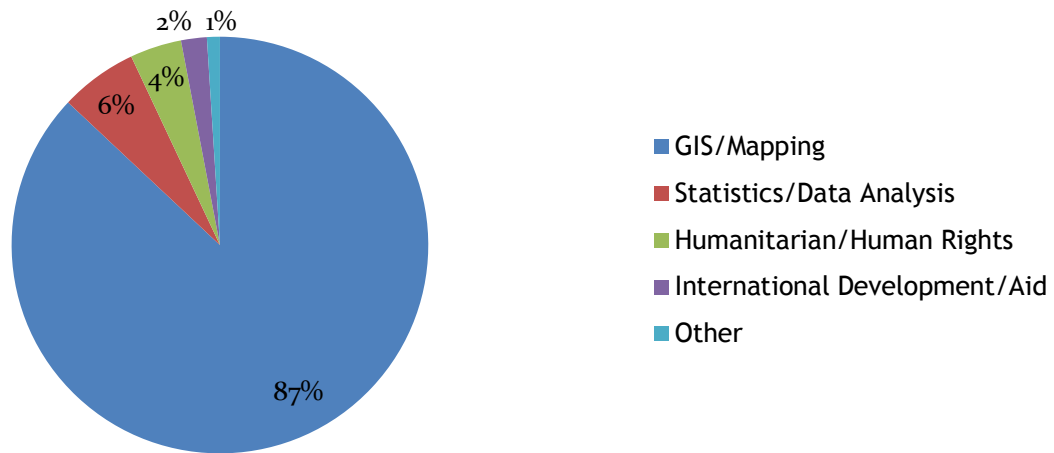


Figure 4 Volunteers who work in a related professional field (n=69)

As explained earlier, because the majority of survey respondents have an affiliation with the GIS Corps, it is possible that the responses are biased towards a more professionalized volunteer. However, when the responses are separated by what kind of group the volunteer first engaged with (GIS Corps or other groups), in both groups the majority of responses indicate working in a related field, *and in both groups* the most popular field is “GIS/Mapping.”

A second question on the survey asked volunteers to indicate any software or online platforms that they used for their crisis mapping projects. Familiarity with software was used as a second way to understand the scope of volunteers’ specific skills. Respondents could select as many options as were representative of their experience from a list that included Ushahidi Crowdmap, ArcMap, QGIS, Tomnod, and “Other” where they could type in other responses.

ArcMap and QGIS, an open source version of ArcMap, are relatively specialized GIS software packages that require at least some understanding of geospatial datasets. The Ushahidi CrowdMap platform plots points of data that are collected from SMS or online reports, or entered into a simple database; it is simpler, designed for anyone to figure out on their own, and available for free on the Ushahidi website. The website promises that after downloading, the user will be plotting data “within minutes” (Crowdmap 2013). Tomnod is a crowdsourcing tool for analyzing satellite imagery that simplifies a project into microtasks that are manageable for non-experts to accomplish.

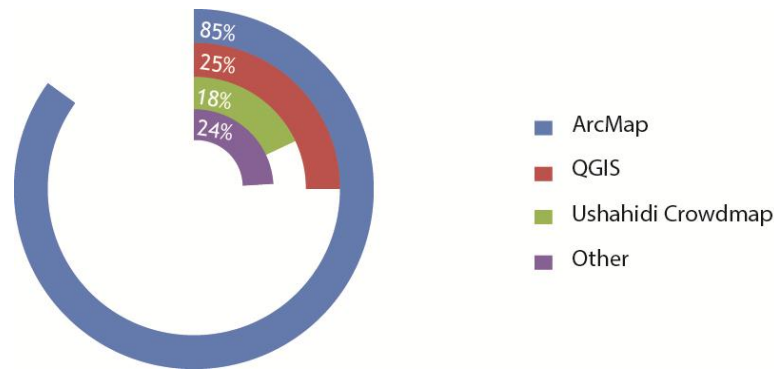


Figure 5 Tools used by volunteers for crisis mapping projects (n= 68)

72% of respondents indicated having used ArcMap and 21% had used QGIS, while only 15% had used CrowdMap and none had used Tomnod (see Figure 5). So, from this list of two technically advanced and two generally approachable tools, it is striking that the advanced tools (ArcMap and QGIS) were significantly more prevalent in responses. In part, these numbers are indicative of the types of projects that volunteers work on – Tomnod would only be used for projects that needed satellite imagery analyzed, while ArcMap can be used for many crisis-mapping activities. However, they are also an indication of the skill level of volunteers – these volunteers either already knew how to use these programs or were able to learn them well enough to complete the necessary tasks. In either case this indicates a certain level of technical skill.

Thus, although the survey does not find that every crisis mapping volunteer comes from a related profession, it is clear that a majority of the volunteers who responded are not amateur mappers.

Motivation

Again, by nature of the fact that they are volunteers, volunteer crisis mappers are often assumed to be indifferent to or unaware of the specific challenges of mapping and of humanitarian work (Flanagin and Metzger 2008). In humanitarian situations every decision to be made affects the lives of people in dire situations. When these decisions are based on information assembled by volunteers the main concern is whether the volunteers understand the importance of maintaining high standards of data collection and analysis (Chandran 2013). A volunteer's intention for participating in a project can also have an impact on that volunteer's perceived trustworthiness; an indifferent volunteer would be less trustworthy. So, motivation is also relevant to the issue of credibility via trustworthiness.

Two survey questions aimed to see how volunteers conceived of their participation, particularly in light of the humanitarian context. One question asked about volunteers' motivation as an indication of their intentions going into a crisis mapping situation. The second question focused on the personal impact of the experience to explain why volunteers continue to participate after their first crisis mapping experience, and what, if anything, they are learning from the experience. This section will discuss the findings from two questions.

Specific Motivations

In general, evaluations of volunteer motivations use several standard categories to explain a volunteer's choice to participate – values, understanding, social, career, protective, enhancement – the Volunteer Functions Inventory (VFI) developed by Clary and Snyder (2002). A previous study of the motivations of volunteer crisis mappers (focused solely on the Standby Task Force)

used these general categories and found that SBTF volunteers were primarily motivated by interest (in gaining and/or practicing skills, learning about technology), but altruism was also a strong motivator (Hitchens 2012). However, “interest” and “altruism” are broad categories. Are the volunteers interested in hard skills or humanitarian work? Are they motivated to help people in general, or is there a specific issue or place that motivates them?

In the survey, volunteers were asked about their motivation for joining a crisis mapping project and were given five options from which they could select one: “interest in a specific country or conflict,” “interest in gaining experience in humanitarian work,” “wanted more practice with particular skills,” “curiosity,” and “other” where they could write in an response. Thus, the “interest” category from general volunteer assessments is split into three options: general interest in humanitarian work, specific interest in a particular event, interest in practicing skills.

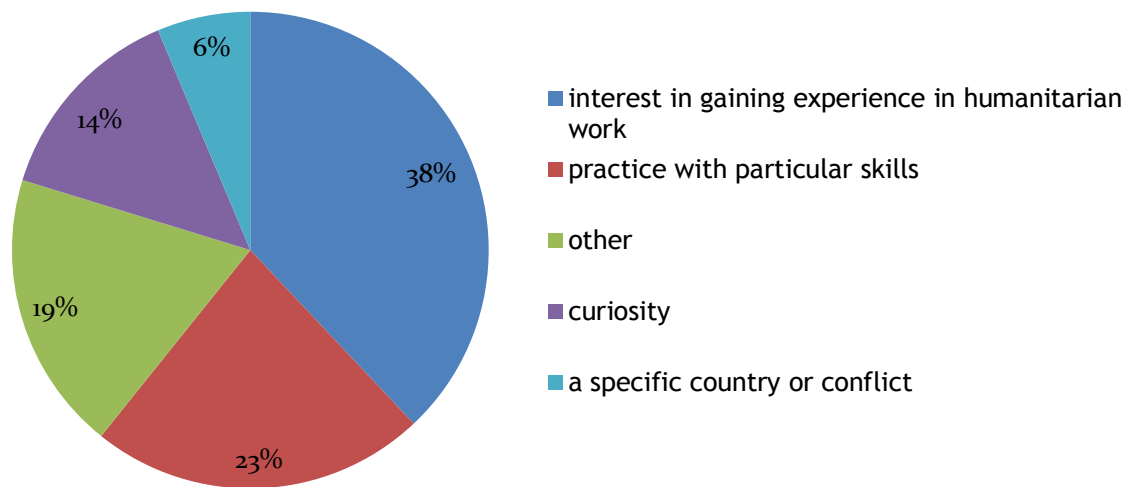


Figure 6 Volunteers' motivation for joining a crisis mapping project (n=79)

The most popular response was “interest in gaining experience in humanitarian work (37%), followed by “wanted more practices with particular skills” (22%) and “other” (19%) (see Figure 6). Most of the responses for “other” listed a variation of an interest in “helping others” (10 out of 15). So, there is a specific focus on humanitarian work which suggests at least an awareness of how it is different from other volunteering and mapping opportunities. The altruism expressed in the “other” category also expresses awareness that this work affects people, and is not merely an exercise. So, like the previous study this shows that altruism is a strong motivator for volunteers, but unlike the previous study, this finds that specifically interest in humanitarian work is the strongest driver.

These findings are consistent with the findings in the Hitchens study of SBTF volunteers. In both cases “interest” is by far the most popular response. The difference is that here the split between skills and humanitarian work is visible.

Personal Impact

In terms of assessing the personal impact of their crisis-mapping experience volunteers were asked, “Do you feel that your involvement in crisis-mapping has had any impact on the following: topics/places you follow in the news, reading, etc., general interest in foreign affairs, your social networks, your career goals, other [write in].” Respondents could choose as many answers as they

needed. 62% of respondents to this question indicated an impact in the topics and/or places they follow in the news. 59% indicated that their career goals were impacted. Interest in foreign affairs and social networks were also frequent choices (38% and 39% respectively) (see Figure 6).

These results indicate learning beyond the hard skills used to do crisis mapping; volunteers are absorbing knowledge about the humanitarian issues that they are engaging with. This would suggest that the process is capable of making volunteers aware of the uniqueness of humanitarian situations.



Figure 7 Volunteers' reported personal impact from crisis mapping projects (n=71)

Thus, these results indicate that a sub-group within the volunteers is self-selected by their particular interest in humanitarian work. Also, a significant portion report personal impacts that suggest that they are absorbing information about humanitarian issues.

Geographic Experience

The two previous sections have presented findings that show the volunteers of crisis mapping projects are a self-selected group with experience in mapping and specific interest in humanitarian work. Finally, this section will look more carefully at where these volunteers are from and where they have lived. Geographic experience is relevant in terms of the local knowledge that volunteers bring to a crisis mapping project, and in terms of discovering any internal geographic bias in the population of volunteer crisis mappers.

Because of the international nature of humanitarian crises and the remote nature of most volunteer crisis mapping efforts it seemed critical to investigate the geographical experiences of crisis mapping volunteers. Also, the global digital divide makes it more likely that such a technology dependent activity has greater representation in areas of the world with better access to such technology. This regional bias could impact how data is interpreted and represented. The most obvious example of this is language. Also, locations are described and defined in different ways in different cultural contexts, and these mismatches can affect data interpretation. However, volunteers who are from the global North may still have knowledge of some places in the global South, depending on their personal experiences, so the survey aimed to gather a comprehensive view of the volunteers' geographic experience.

Nationality

Both the 'formal' humanitarian sector and the greater international development sector have a Northern bias in terms of the nationalities of those employed and the countries that give the most financial contributions. Thus, the first fact to establish is whether the volunteer crisis mapping

community also has a Western bias. In fact, an overwhelming majority of respondents are from (ie. their nationality) the global North; 84% of respondents are from countries high income countries in the global North⁵, with 54% just from the U.S. This is not a particularly surprising finding given that the International Conference on Crisis Mapping has been held in the U.S. or Europe since its creation in 2009⁶, and that English is the dominant language of organized crisis mapping.

Countries Lived In

Still, nationality is just one measure of a person's geographical experience; a person can hold the nationality of one country while living in another, thus possessing knowledge of both. So, to gain a more complete image of a volunteer's geographic experience, the survey also asked respondents to list all the countries where they had spent time in the past five years⁷. 26% of respondents had lived or spent time in countries other than that of their origin. 85% of respondents lived in the same country of their nationality and 17% had lived in other countries as well as the country of their nationality. These findings suggest some mobility among volunteers, but a large majority whose geographic experience is limited to one country.

Location of Crisis Mapping Projects

Finally, volunteers were asked to list the locations of the crisis mapping projects in which they had participated. For a final comparison both lists of countries – those of nationality and residence – were compared to the volunteers' responses about the location of projects. 29 (45%) had worked on projects in countries where they were from or had lived; 36 (56%) had worked on projects in places where they had no recent experience (with 6 (9%) overlapping both of these two categories); and 5 (8%) worked on global projects. Figure 9 shows the breakdown of volunteer geographic experience and corresponding crisis mapping project location. Figure 7 is a map that shows where volunteers are from (combining nationality and countries lived in) in blue with the locations of their crisis mapping projects overlaid in red. Darker colors indicate more responses related to that country.

⁵ Volunteer nationalities: American, American Indian, Australian, Belgian, British, Canadian, Filipino, Finnish, German, Guatemalan, Guyanese, Indian, Israeli, Italian, Nigerian, Norwegian, Pakistani, Portuguese, Ugandan, Vietnamese.

⁶ However, the 2013 ICCM conference will be held in Nairobi, certainly a sign of shifting tides.

⁷ Five years was chosen to overlap with the timeframe of crisis mapping projects, most of which began after 2007 when the Ushahidi platform became available.

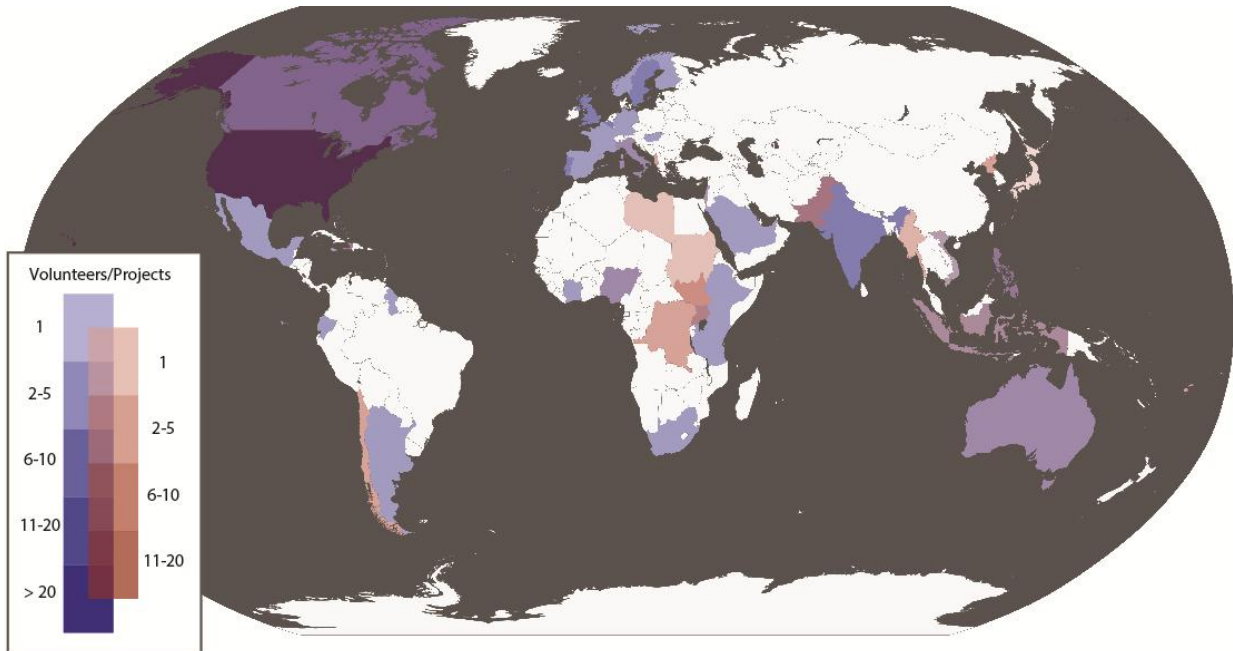


Figure 8 Volunteers' Geographic Experience - blue indicates either nationality or having been to a country, red indicates working on a crisis map in that country

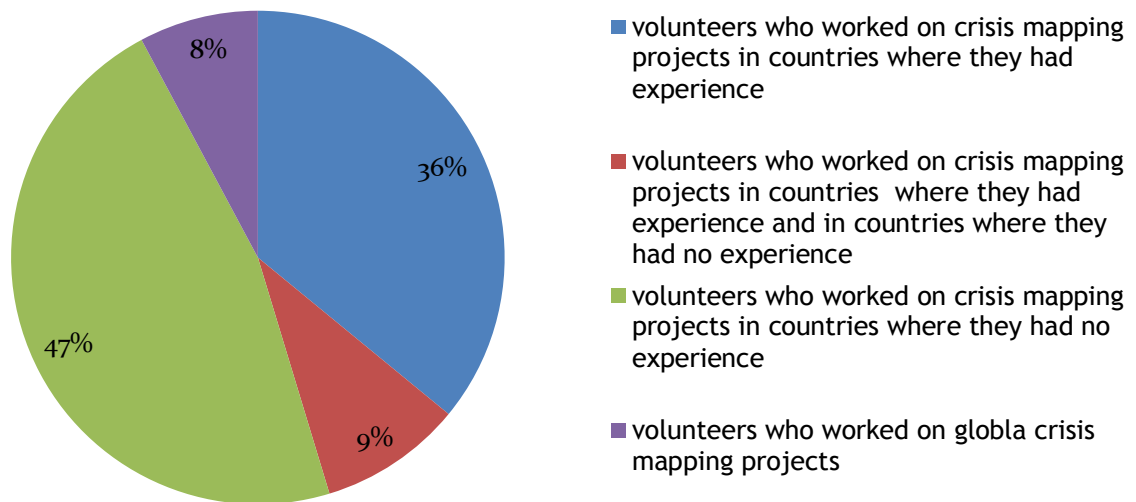


Figure 9 Overlap of volunteers' geographic experience & the location of their projects (n=64)

Although there is not one single trend here, it is clear that a significant portion of volunteers choose to participate in countries where they have a personal stake or connection. The benefit of these volunteers is that they also may bring a kind of 'local' knowledge to the project (discussed at length below). And, given the time frame – five years – that volunteers were asked about living or traveling abroad, it is possible that some of the 47% who seem to have worked on projects in places they have not been, in fact have some experience in that location outside of the five year window.

The role of 'local' knowledge

Typically, the 'local' knowledge comes from people who live at the site of the project and thus serve as a means of knowing the deeper context. However, in the case of remote crisis mapping projects, 'local' knowledge can be any better understanding of the local context – languages, slang, referential terms (landmarks, etc.).

For example, consider the finding during a USAID-led crowdsourcing project that participants with knowledge of a place were able to help decode addresses that were described in ways that did not reflect the standard Western format. The project was not a crisis mapping project, but USAID did reach out to crisis mapping volunteer organizations, including the Standby Task Force and the GIS Corps, for volunteer participation. The aim of the project was to geocode a large dataset of locations of loan recipients in the international USAID Development Credit Authority project. Volunteers were each given a few addresses to work on, entering their results into an online form that would create a database. Volunteers were supposed to locate each address in a region of the country so the results could show the reach of the loan program. However, many of the 'addresses' were written in the local format and often did not include a street name, number, or district. So, volunteers had to be creative problem solvers to figure out the location of these addresses. Some volunteers relied on their own experiences or social networks to determine the correct location for these addresses.⁸ Thus, this case proves the relevance of some form of local knowledge or experience on the part of the volunteer or their social networks. (The survey did not ask volunteers about the global reach of their social networks. Although, it seems likely that those with more global travel experience would have a more global social network, this could be an area for more research.)

Conclusion

For the group of volunteer crisis mappers surveyed the assumptions of the literature do not seem to be accurate. A great majority are GIS and mapping professionals, and they apply these skills while acting as a volunteer crisis mapper as evidenced by their use of advanced software. Their motivations are diverse, although the largest subset was specifically interested in humanitarian work. And the personal impacts of crisis mapping seemed to increase interest in and awareness of international issues. Finally, while the geographic origins of crisis mapping volunteers indeed shows a bias towards the global North, the volunteers show a high degree of global mobility which presents the possibility of local knowledge and global social networks.

In terms of their credibility, the volunteers surveyed displayed attributes that merit trust and evidence expertise. Their professional skills and affiliations are a testament to the predominant mapping expertise that these volunteers bring to their projects. Meanwhile, their motivations support their trustworthiness by disproving their indifference to the issues at stake in crisis mapping.

⁸ Shadrock Roberts, presentation at the Wilson Center, Washington DC, July 28, 2012.

THE ROLE OF VOLUNTEER ORGANIZATIONS

This chapter will focus on the organizations that coordinate volunteer crisis mapping projects. These volunteer organizations are critical in distinguishing between other amateur mapping projects and organized volunteer crisis mapping interventions. Unlike ad hoc responses or loose communities, the organizations manage volunteer recruitment and training, project selection and definition, and coordination with 'formal' humanitarian partners in the field. They also establish ethical codes and standards to guide the actions of the volunteers. In terms of establishing source credibility, the organizations make institutional connections on behalf of volunteers and vouch for their experience.

Just like the volunteers, crisis mapping organizations are not a homogenous group. The distinction can be seen in the way they conceptualize their role as an organization and the role of their volunteers. One type of organization emulates a professional, technically focused environment, treating volunteers like hired professional. The other type of organization is transparent, flexible and focused on humanitarianism. It aims to train anyone to be a remote humanitarian.

This chapter will look at two organizations, the Standby Task Force and the GIS Corps, as representative case studies of these two types of volunteer crisis mapping organizations. First each organization will be introduced with a brief description of the organization's origins and its organizational structure. Then, the role of the volunteer, code of conduct and institutional connections will be explored to draw out the particularities of each type of organization. Finally, a comparative analysis of the two types will explain how each establishes the credibility of their volunteers.

Methodology

Research on volunteer crisis mapping organizations took two forms – semi-structured interviews with key players in volunteer crisis mapping, and textual analysis of online content, particularly for the two case organizations, the GIS Corps and the Standby Task Force. Interview subjects were chosen through a snow-balling technique, where one interviewee would recommend other key players. Some subjects were individually targeted because of their role in a particular organization. Initial interviews were held with contacts from my personal network after working in a related field for the summer.⁹ These initial interviewees included two remote-sensing professionals from the human rights and humanitarian fields, and two former crisis mapping volunteers who had since entered the humanitarian field professionally. The initial interviews were also useful in defining the field and its major actors. Some volunteer organizations were mentioned in these early interviews, but it was not until the International Conference on Crisis Mapping (ICCM) 2013 that the landscape of volunteer organizations became apparent. At this conference I met several leaders in the field of volunteer crisis mapping, and from this initial contact was able to schedule a more formal interview. The two organizations that became cases

⁹ I worked as a summer intern at the American Association for the Advancement of Science on the Geospatial Technologies for Human Rights project.

were chosen in part because they were the two volunteer organizations represented by my interview subjects. I chose to use both organizations because a comparison between the two highlighted differences that seem consistent across the broader landscape of volunteer crisis mapping organizations.

It should be noted that the nature of the volunteer crisis mapping community encourages openness, and consequently a remarkable amount of information is available online on the organizations' websites, and through the personal blogs of key participants.¹⁰ The online resources included most of the practical documentation for past crisis mapping events, including training materials and sometimes the actual materials used to complete tasks. This high level of transparency makes it possible to learn a lot about the operations and past experiences of an organization. The information presented on these websites can also be considered a form of marketing material that show how the organization conceives of itself and wants to be represented to the outside world, and it was also analyzed as thus.

Potential Biases

These organizations seem to be two of the leading volunteer crisis mapping organizations in the U.S., but this impression could be biased by my exposure to them. There is also a U.S.-centric bias to my research based on the fact that I am researching primarily in English (some French) and my interactions with the volunteer crisis mapping community – from the conference to working with members of it – have all taken place in the U.S.

The Professional Volunteer Organization: The GIS Corps

The GIS Corps is functions like a volunteer technical community whose volunteers perform crisis mapping projects as well as other forms of technical assistance. It is affiliated with the Urban and Regional Information Systems Association (URISA), the main professional association of GIS professionals in the U.S. It represents the professionally-oriented type of volunteer crisis mapping organization.

Background & Organizational Structure

The GIS Corps predates most other crisis-mapping efforts. Shoreh Elhami, the founder, remembers first having the idea around the year 2000. As a full time GIS professional working in county government, she envisioned a space for GIS professionals to use their skills in ways that would “expand” their applications and answer needs of disadvantaged organizations and communities that needed such expertise for a short-term project.¹¹ After discussing the idea with several colleagues, she formally presented the idea to the board of URISA in October 2003. URISA agreed to take on the GIS Corps as one of their projects, and the first project took place in April 2004.

Today, the GIS Corps has almost 3,000 registered volunteers. They have activated over 400 of these volunteers to participate in 111 projects in 46 countries. Some of these projects were done remotely, while others involved sending the ‘expert volunteers’ into the field. Not all of the projects involved a crisis or humanitarian situations, but all partner organizations (the organization contracting the volunteers) represent “underserved communities worldwide”

¹⁰ Personal blogs include those of Patrick Meier, of the Standby Task Force, formerly Ushahidi and the Digital Humanitarian Network, Anahi Ayala Iaccui, and Helena Puig, both of SBTF.

¹¹ Shoreh Elhami, interview with author, December 10, 2012.

(Organizing Principles and Policies 2009). Volunteer tasks include building databases, performing spatial analysis, modeling, capacity building or teaching in related fields, app development and project evaluation.

GIS Corps is run by a board of seven GIS professionals, each with over 20 years of experience. Board members are responsible for building relationships with partner organizations, recruiting volunteers, and evaluating volunteer applicants for specific projects. The organization is run on a minimal budget; neither board members nor volunteers receive payment for their time. Partner organizations are responsible for covering any financial costs if volunteers do work in the field. In the early years of GIS Corps most projects took place in the field. However, in recent years remote volunteering has increased. Today, Elhami estimates that 4 out of 5 projects are remote.¹²

Volunteer Management

The professional attitude of the organization is apparent in the ways in which volunteer are recruited and assigned to projects. Volunteer recruitment in the early years of GIS Corps centered on the two major annual GIS-focused conferences in the U.S. – the ESRI conference (which draws over 15,000 people) and the URSIA conference (which draws about 500 people). GIS professionals could learn about the activities of the GIS Corps at their booths at both events. Media coverage of GIS Corps involvement in certain major events, like Hurricane Katrina, has also spurred volunteer signup.

Volunteers are managed like short-term consultants. New volunteers register on the GIS Corps website, where their interests and skills are logged into a database. From this database board members monitor volunteers and their participation in projects. When there is a new project, the board sends out an email with the job requirements to the volunteers. Sometimes, when the job requires a very specialized set of skills (like remote sensing analysis) the board will only send the description to the subset of volunteers who list those skills. Interested volunteers reply with their interest and are evaluated on the basis of their CV, references and an interview with a board member. When a project requires multiple volunteers, one is selected as the team leader.¹³ Thus, the process of assigning volunteers to a project is quite similar to a professional hiring process.

After the deployment volunteers and partner organization fill out feedback surveys. The GIS Corps board uses these surveys to monitor consistency and level of service as well as volunteer and partner satisfaction. Volunteer satisfaction is critical to the maintenance of a successful volunteer organization, and so GIS Corps does as much as possible, given the small budget, to acknowledge volunteers. Volunteers receive certificates or letters of appreciation, and are encouraged to post their photos and blogs on the GIS Corps website. Also, because there are so many registered volunteers, preference in allocating projects is given to volunteers who have not previously participated in a project.¹⁴

Institutional Connections

The GIS Corps' initial institutional connections were focused on the geospatial data communities, as evidenced by their association with URISA. However, after sending some volunteers to work on the reconstruction in Indonesia after the 2005 tsunami, the United Nations Joint Logistics Centre

¹² Shoreh Elhami.

¹³ Ibid.

¹⁴ Ibid.

reached out to GIS Corps for technical assistance. This was a turning point in terms of getting recognition and building relationships with major humanitarian institutions.¹⁵ The same year, GIS Corps deployed 30 volunteers to help with the response to Hurricane Katrina. Such a large and technical force of volunteers on the ground got a lot of attention from the media, providing a new source of volunteer recruitment for the GIS Corps. Since these two pivotal projects, the GIS Corps has worked with multiple UN bodies, NGOs such as the Red Cross and the Information Management & Mine Action Programme (iMMAP), and other volunteer crisis mapping organizations like CrisisCommons and HumaniNet (Our Projects 2013).

Code of Conduct

Following in its overarching conception as a professional volunteer organization, the GIS Corps Code of Ethics heavily draws from relevant professional codes of conduct for geospatial and data management professions. It focuses on good practices for data scientists. There is no mention of the humanitarian context.

Thus, it is clear that the GIS Corps is primarily a volunteer technical community that sometimes participates in crisis mapping activities. From the Code of Ethics to the volunteer assignment policies, the GIS Corps focuses its operations on assuring high quality data and mapping skills. Projects in humanitarian contexts are treated no differently.

The Volunteer Humanitarian Organization: The Standby Task Force

The Standby Task Force (SBTF) was founded in 2010 by several veteran crisis mapping volunteers who wanted to create a framework for managing volunteer crisis mapping efforts and a maintained network of volunteers so they did not have to start from scratch at every crisis.¹⁶ The organization is primarily inclusive – anyone can sign up to be a volunteer, and anyone can join a project – and explicitly focused on aiding humanitarian activities.

Background & Organizational Structure

After leading two consecutive volunteer crisis mapping efforts in Haiti (earthquake) and Chile (earthquake), and participating in a third in Pakistan (floods) in 2010, Patrick Meier realized that there was enough sustained interest in crisis mapping to create a more permanent online community of willing volunteers (Meier 2011). So, he founded the Standby Task Force with several other experienced crisis mappers, and launched it at the 2010 International Conference of Crisis Mappers. The first partner organization was UN OCHA, which had seen the successful use of the Ushahidi platform in all three previous cases (Haiti, Chile and Pakistan) and wanted the SBTF to participate in a training simulation for OCHA staff members. After a little more than two years the SBTF has over 900 volunteers registered.

The organizational model is intentionally open-source and transparent, with all materials available online, and all spaces open to any registered volunteer (Our Model n.d.). The Core Team, a group of lead volunteers, is responsible for choosing projects, managing partner organizations, and monitoring volunteers. Four of the original founders¹⁷ serve on an advisory board that provides guidance to the Core Team and builds institutional partnerships.

¹⁵ Ibid.

¹⁶ Anahi Ayala Iacucci, interview with author, December 7, 2012.

¹⁷ Patrick Meier, Anahi Ayala Iacucci, Helena Puig Larrauri, and Jaroslav Valuch

Task force teams organize the workflow on a specific project with one or more coordinator stepping in to run a team for a project. There are ten task force teams, although not every project requires every team: the geo-location team, the humanitarian team, the report team, the media monitoring team, the SMS team, the task team, the tech team, the translation team, the verification team, and the analysis team. Workflow between task forces, and between the SBTF Core Team and on the ground partners is constantly being adjusted based on feedback and experience. Partner organizations are responsible for evaluating the volunteers' contributions at the end of a project.

Volunteer Management

The SBTF focuses on providing the structure for volunteers to engage in humanitarian events in a productive manner. Although there is some oversight and the board retains the ability to kick people out, in general volunteers are left to assess their own skills and do trainings independently (with SBTF materials) if they are interested.

Anyone, regardless of skill level, can sign up to be a volunteer and thus receive all the “activation” emails (the emails that announce new projects). Volunteers register on the website, filling out their skills and interests. When there is a new project all volunteers receive an email with a description of the project, the necessary tasks (broken into task teams) and the time frame. Interested volunteers simply fill out an online form and show up for skype meetings. Training materials are available on a YouTube channel and as downloadable power points. Sometimes task team leaders will lead specific trainings (remotely), in particular for new volunteers.

The SBTF does not control who participates in what project, so there are some volunteers who come back often and do a lot, but there are also some who do minimal work and may just join for the community or out of curiosity (to see how it works). Instead of worrying about how to cull these minimal contributors and create a force of highly committed and experienced volunteers, Patrick Meier, one of the SBTF directors, is interested in how to take advantage of even the shortest, most fleeting attention spans of volunteers by breaking down tasks as much as possible (“microtasking”).¹⁸

Institutional Connections

UN OCHA saw the power of volunteer crisis mappers during the 2010 earthquake in Haiti, so they were the first to reach out to the newly formed SBTF. The first project was a simulation training using data from an earthquake in Colombia. Since then, SBTF volunteers have participated in several projects with OCHA. The SBTF has worked with other actors including USAID and the World Health Organization (WHO).

The personal networks of the founders also help build linkages. For example, Patrick Meier is professionally connected with Ushahidi, the Harvard Humanitarian Initiative (which he helped found) and the Qatar Foundation's Computing Research Institute (QFCRI). The results of these connections are visible in SBTF collaborations with these other actors – such as the use of the QFCRI computing abilities to do the first run of data cleaning for the SBTF Typhoon Bopha mission (Meier 2012).

¹⁸ Patrick Meier.

Code of Conduct

Every volunteer must sign the Standby Task Force Code of Conduct. It is based on humanitarian principles and draws from multiple humanitarian organizations' guidelines, including those of the Red Cross and the UN. In addition to these concepts like neutrality and humanity, the SBTf Code addresses some specific applications given the work being done by volunteers. For example, it emphasizes the importance of empowering local actors and involving them whenever possible. Beyond the principle of "do no harm" principle, it elaborates that volunteers should not do anything that could potentially endanger people. This aim is echoed in a section on data quality that includes the warning against inciting panic, presumably with misrepresented or incorrect data.

The Standby Task Force illustrates the second type of volunteer crisis mapping organization that focuses on the humanitarian aspect of volunteering. It strives to be open to volunteers of any level of technical ability by offering training opportunities and tasks at many different skill levels.

Comparative Analysis

These two types of volunteer crisis mapping organizations establish their credibility as organizations differently. The differences perceived in the way they conceptualize the role of their volunteers and the organization's role in shaping the volunteers ultimately speak to two different foundations for credibility. The Standby Task Force emphasizes the humanitarian aspects of the work their volunteers do, and builds on the institutional connections made through projects and key individuals, like Patrick Meier. Their transparency also acts as a means of establishing credibility because it makes all of their methods – from volunteer training to final products – open and available for scrutiny. Meanwhile, the GIS Corps focuses on the professional credentials of both itself as an organization with strong ties to the GIS professional world, and of the volunteers who are treated like professionals even though they are volunteers.

Significantly, both groups have successfully made contacts and built working relationships with actors in the 'formal' humanitarian sector, like UN OCHA. Both are also members of the Digital Humanitarian Network. So, despite their organizational and conceptual differences, these organizations share the same space institutionally as organized representatives of volunteer crisis mappers.

CONCLUSION

As volunteer crisis mappers are being incorporated in the 'formal' work flow of humanitarian actors their work carries more weight in the decision making of humanitarian actors, and so, their credibility within the 'formal' humanitarian sector is of critical importance. The fact that they are being incorporated into work flows of 'formal' actors is an indication that they already have some credibility. Nevertheless, this paper set out to examine their credibility on the scale of the volunteers and the organizations.

Volunteer mappers are questioned in the related Web 2.0 and neogeography literature for being amateurs that do not have the training and expertise of professional mappers. Both their ability to produce high quality data and their motivations are questioned. However, the survey results indicate that these crisis mapping volunteers do have relevant skills. They also have diverse geographical experience which can translate into local knowledge or more geographically diverse social networks – which can be an asset for crisis mapping work. Some volunteers have a distinct interest in humanitarian work and many record personal benefits (as opposed to professional) from participating in such work.

The volunteer organizations play an interesting role because they control volunteer activities (by training and deploying volunteers) and they build institutional relationships with other actors in the humanitarian field. Yet, volunteer crisis mapping organizations do not see themselves in the same way. Some, like the GIS Corps, still act as technical consultants and do not distinguish humanitarian response work from other volunteer technical assistance. They manage volunteers in ways very similar to a professional environment and guide their behavior with similar codes of conduct. Other volunteer organizations, like the Standby Task Force, focus on their role as humanitarians. This makes their mission and code of conduct more compatible with actors in the 'formal' humanitarian sector. However, their project assignment model seeks to be inclusive rather than professional, raising questions about volunteer preparedness and accountability. They do not screen volunteer by their skills, instead assuming that they will do what they are capable of doing.

Future Areas of Research

For such a nascent field there is a lot that remains to be studied. The author found only one in depth evaluation of a volunteer crisis mapping project – an evaluation of the Ushahidi Haiti project (Morrow, et al. 2011). Now that the relationships with the 'formal' humanitarian actors has changed so significantly to be much more inclusive of these volunteer efforts, it would be very informative to do a similar study that looked at the impact of the data collected in a volunteer crisis mapping project and how it was used in humanitarian decision making.

The volunteers and their organizations are both in the process of evolving as they grown and build stronger linkages with the 'formal' humanitarian sector. It would be interesting, for example, to look at the evaluation of the two different types of volunteer organizations over the coming years. Perhaps, the differences identified in this paper will fade away as the two types of organizations bend to fulfill the needs of the same industry – the 'formal' humanitarian sector. Similarly, it is possible that the volunteers themselves will change as they participate in these crisis mapping projects.

BIBLIOGRAPHY

- "Activation Criteria." *Standby Task Force*. n.d. <http://blog.standbytaskforce.com/about/activation-criteria/> (accessed June 3, 2013).
- Badger, Emily. "How the internet reinforces inequality in the real world." *The Atlantic Cities*, February 2013.
- Chandran, Rahul and Andrew Thow. *Humanitarianism in the network age*. Geneva: United Nations, 2013.
- Clary, E. G., and M. Snyder. "The motivations to volunteer: theoretical and practical considerations." *Current Directions in Psychological Science* 8 (2002): 156-159.
- Clemenzo, Jean-Yves. *Ushahidi project and mission 4636 in Haiti: Participation, representation and political economy*. unpublished dissertation. London School of Economics, September 2011.
- Crampton, Jeremy W. "Maps as social constructions: power, communication and visualization." *Progress in Human Geography* 25, no. 2 (2001): 235-252.
- Crisis Mappers*. 2013. <http://crisismappers.net/> (accessed May 30, 2013).
- Cross, American Red. *More Americans using mobile apps in emergencies*. Washington, DC: Red Cross, 2012.
- "Crowdmap." *Ushahidi*. 2013. <http://www.ushahidi.com/products/crowdmap> (accessed June 3, 2013).
- Darcy, James, Heather Stobaugh, Peter Walker, and Dan Maxwell. *The use of evidence in humanitarian decision making*. ACAPS Operational Learning Paper, Somerville, MA: Feinstein International Center, 2013.
- Digital Humanitarian Network*. 2013. <http://digitalhumanitarians.com/> (accessed June 3, 2013).
- Elwood, Sarah. "Critical issues in participatory GIS: Deconstructions, reconstructions, and new research directions." *Transactions in GIS* 10, no. 5 (2006): 693-708.
- Elwood, Sarah. "Volunteered geographic information: Future research directions motivated by critical, participatory, and feminist GIS." *GeoJournal* 72 (2007): 173-183.
- Flanagin, Andrew J. , and Miriam J. Metzger. "The credibility of volunteered geographic information." *GeoJournal* 72 (2008): 137-148.
- Friedland, Gerald and Robin Sommer. "Cybercasing the joint: On the privacy implications of geo-tagging." *HotSec'10 Proceedings of the 5th USENIX conference on Hot topics in security*, 2010.
- Goodchild, Michael. "Citizens as sensors: The world of volunteered geography." *GeoJournal* 69 (2007): 211-221.

- Goodchild, Michael. "NeoGeography and the nature of geographic expertise." *Journal of Location Based Services* 3, no. 2 (June 2009): 82-96.
- Haklay, Muki, Alex Singleton and Chris Parker. "Web mapping 2.0: The neogeography of the GeoWeb." *Geography Compass* 2, no. 6 (2008): 2011-2039.
- Hitchens, Evelyn. *The Motivations Behind the SBTF*. unpublished dissertation, University of Birmingham, 2012.
- International Charter on Space and Major Disasters*. 2013.
<http://www.disasterscharter.org/web/charter/home> (accessed May 31, 2013).
- Johnson, Peter A., and Renne E. Sieber. "Motivations driving government adoption of the Geoweb." *GeoJournal* 77 (2012): 667-680.
- Kawasaki, Akiyuki, Merrick Lex Berman, and Wendy Guan. "The growing role of web-based geospatial technology in disaster response and support." *Disasters* 37, no. 2 (2013): 201-221.
- Kwan, Mei-Po. "Feminist Visualization: Re-Envisioning GIS as a Method in Feminist Geographic Research." *Annals of the Association of American Geography* 92, no. 4 (2002): 645-661.
- Laituri, Melinda, and Kris Kodrich. "On line disaster response community: People as sensors of high magnitude disasters using internet GIS." *Sensors* 8 (2005): 3037-3055.
- Margesson, Rhoda. *Indian Ocean Earthquake and Tsunami: Humanitarian assistance and relief operations*. Washington, DC: Congressional Research Service , 2005.
- Maron, Mikel. "Haiti OpenStreetMap response." *Brain Off*. January 14, 2010.
<http://brainoff.com/weblog/2010/01/14/1518> (accessed June 11, 2013).
- Meier, Patrick. "Changing the world one map at a time." *Standby Task Force*. March 6, 2011.
<http://blog.standbytaskforce.com/changing-the-world-one-map-at-a-time/> (accessed June 4, 2013).
- . "How the UN used social media in to response to Typhoon Pablo." *Standby Task Force*. December 12, 2012. <http://blog.standbytaskforce.com/how-the-un-used-social-media-in-response-to-typhoon-pablo-updated/> (accessed June 5, 2013).
- Morrow, Nathan, Nancy Mock, Adam Papendieck, and Nicholas Kocmich. *Independent Evaluation of the Ushahidi Project*. Development Information Systems International, 2011.
- NBC News*. "'Logistical nightmare' to get help to victims." January 14, 2010.
- Nelson, Anne, Ivan Sigal, and Dean Zambrano. *Media, Information Systems and Community: Lessons from Haiti*. The Knight Foundation, 2010.
- O'Reilly, Tim. "What is web 2.0: Design patterns and business models for the next generation of software." *O'Reilly*. 30 9, 2005. <http://oreilly.com/web2/archive/what-is-web-20.html> (accessed April 2013).

- "Organizing Principles and Policies." *GIS Corps*. 2009.
http://www.giscorps.org/index.php?option=com_content&task=view&id=9&Itemid=54
(accessed June 4, 2013).
- "Our Model." *The Standby Task Force*. n.d. <http://blog.standbytaskforce.com/our-model/>
(accessed June 4, 2013).
- "Our Projects." *GIS Corps*. 2013.
http://www.giscorps.org/index.php?option=com_content&task=view&id=22&Itemid=59
(accessed June 4, 2013).
- Perlroth, Nicole. "Syria, and Pro-Government Hackers, Are Back on the Internet." *The New York Times*, May 8, 2013.
- Raymond, Nathaniel, Caitlin Howarth and Jonathan Hutson. "Crisis mapping needs an ethical compass." *Global Brief*. February 6, 2012. (accessed August 2012).
- Reidenberg, Joel R., Robert Gellman, Damela Debelak, Adam Elewa and Nancy Liu. *Privacy and missing persons after natural disasters*. New York: Center for Law and Information Policy, Fordham University School of Law and the Woodrow Wilson International Center for Scholars, 2013.
- Roche, Stephane, Eliane Propeck-Zimmermann, and Boris Mericskay. "GeoWeb and crisis management: issues and perspectives of volunteered geographic information." *GeoJournal* 78 (2013): 21-40.
- Sieber, Renee. "Public participation geographic information systems: A literature review and framework." *Annals of the Association of American Geographers* 96, no. 3 (September 2006): 491-507.
- Smith, James F. "Tufts map steered action in chaos." *The Boston Globe*, April 5, 2010.
- UN OCHA. "OCHA on Message: Humanitarian Principles." 2010.
- UN OCHA. *The Cluster Approach*. Geneva: United Nations , 2012.
- Underwood, Sarah. "Improving disaster management." *Communications of the ACM* 53, no. 2 (2010): 18-20.
- Valuch, Jaroslav. "Colombia Earthquake Simulation – testing ground for volunteer mapping and response cooperation." *The Standby Task Force*. January 2, 2011.
<http://blog.standbytaskforce.com/columbia-earthquake-simulation-%E2%80%93-testing-ground-for-volunteer-mapping-and-response-cooperation/>.
- "Where we work." *United Nations Office for the Coordination of Humanitarian Affairs*. n.d.
<http://www.unocha.org/where-we-work/all-countries> (accessed June 11, 2013).
- Zook, Matthew, Mark Graham, Taylor Shelton, and Sean Gorman. "Volunteered geographic information and crowdsourcing disaster relief: A case study of the Haitian earthquake." *World Medical & Health Policy* 2, no. 2 (2010): 7-28.

APPENDIX

The Volunteer Crisis Mappers Survey

Volunteer Crisis Mappers Survey

Hello crisis mappers! I am writing my master's thesis on the role of volunteers in crisis mapping. I would like to know WHO you are and HOW you came to be a crisis mapper. If you are willing to participate, please fill out the following 15 questions. It shouldn't take more than 5-10 minutes. Your answers will be anonymous, but if you would like to see the overall findings, check back on my thesis website (<http://elresor.scripts.mit.edu/thesis/>) in the spring. Thank you, Elizabeth (elresor@mit.edu)

1. How did you first hear about crisis mapping?

Check one.

- From a friend/colleague who is a volunteer
- From a news story about crisis mapping volunteers
- From social media (facebook, twitter, etc)
- From a conference or event
- Other:

2. What motivated you to become a crisis mapping volunteer?

Check one.

- Interest in a specific country or conflict
- Interest in gaining experience in humanitarian work
- Wanted more practice with particular skills
- Curiosity
- Other:

3. What was the organizing group/platform with which you did your first crisis mapping project?

Check one.

- Stand By Task Force
- GIS Corps
- Crisis Commons
- Humanitarian Open Street Map
- Humanity Road
- Other:

4. How many crisis mapping projects have you participated in?

5. Where was did these crises take place?

List all locations of crises in which you participated as a volunteer.

6. Have you worked with any of these groups?

Check all that apply.

- Stand By Task Force
- GIS Corps
- Digital Humanitarian Network
- Crisis Commons
- Humanitarian Open Street Map
- Humanity Road
- Other:

7. Have you used any of these tools for a crisis mapping project?

Check all that apply.

- Ushahidi CrowdMap
- AcrMap
- QGIS
- Tomnod
- Other:

8. Do you work or study in a field related to crisis mapping?

Check one.

- No
- Yes - GIS/Mapping

- Yes - Statistics/Data Analysis
- Yes - Humanitarian work
- Yes - Human Rights work
- Yes - Logistics/Supply Chain Management
- Yes - International Development/Aid
- Other:

9. What is the highest level of education you have attained?

Check one. (For current students, put expected degree.)

- High School/ GED
- College/University
- Graduate Degree/ Master's
- Ph. D.
- Other:

10. What is your gender?

- Male
- Female

11. What is your age?

- Under 22
- 22 - 35
- 36 - 50
- Over 50

12. What is your nationality?

13. Where have you lived in the past five years?

List country names.

14. Do you feel that your involvement with crisis mapping has had an impact on any of the following?

Check all that apply.

- Topics/Places you follow in the news, reading, etc.
- General interest in foreign affairs
- Your social networks (have you made new friends/contacts through these projects?)
- Your career goals
- Other:

15. Is there anything else you would like to share about your experience as a crisis mapper?

Never submit passwords through Google Forms.

Figure 10 Volunteer Crisis Mappers Survey