

# Crisis Mapping: The Construction of a New Interdisciplinary Field?

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[Note: this is not the official version: Draft only]

**Appears in:** *Journal of Map & Geography Libraries: Advances in Geospatial Information, Collections & Archives*, 8:2, 101-117 (2012).  
<http://dx.doi.org/10.1080/15420353.2012.662471>

*This paper summarizes recent developments in crisis mapping and offers a meta-analysis of nascent, community-led conversations about this evolving area of concern. Such discussions occur in diverse fora: from meetings and conference calls with large government agencies to asynchronous email threads, to sessions with nongovernmental agencies, large and small, simulated exercises, and between and among scholars, crowds, practitioners, affiliated networks and individuals all around the world. I've had the opportunity to be involved in many of these debates as co-founder of the International Network of Crisis Mappers.*

The International Network of Crisis Mappers is a global forum to share lessons learned, best practices, and challenges from the diverse deployment of live crisis maps in a variety of complex environments. The Google group and website are venues for engaging in across agencies, domains, and cultures. Individuals affiliated with 1,500 very different institutions and organizations in nearly every country are able to talk openly about the technical, ethical, privacy and security implications of their work via simple mechanisms: email, skype, and in personal conversations at the International Conference Crisis Mapping (ICCM).<sup>1</sup> But conversations about crisis mapping extend even beyond this diverse network. Meetings on crisis mapping or closely related subjects are rapidly proliferating because so much can and has been crisis mapped: from humanitarian assistance and disaster response after tornados and earthquakes to citizen-action around government repression, street crime, protests, oil spills, and infectious disease, to name but a few, so many individuals and institutions from around the world have begun discussing and debating these rapid developments. We are thus witnessing the rapid rise of concurrent, multiple, and overlapping conversations on crisis mapping and there are already far too many discussions underway for any one individual or group to be engaged in all debates. However, I've been fortunate enough to participate in hundreds of meetings and conference calls over the past three years on this topic, in several countries on three continents. What follows is a meta-analysis of these conversations.

In many of these conversations, core questions continue to surface: What exactly is crisis mapping? Has crisis mapping sufficiently opened enough new questions and debates that these early discussions should be considered early work in an entirely new field, or should crisis mapping be considered a subset of another field? If so, which field best subsumes these debates? How can the debates in existing fields help us situate and understand these puzzles? Is crisis mapping better viewed as a method or a tool or something else entirely? In these discussions, the conceptual, practical and theoretical are raised in rapid succession, and each informs the other.

A brief meta-analysis of evolving conversations around crisis mapping from late 2009 until early 2012 follows. This rough sketch of core concepts and debates remain contingent and contested, yet they are crucial starting points for the conversation.

## **Conversation about the Conversation I: Conceptual Hooks & Shared Language**

Crisis mapping is inherently interdisciplinary, situated at the nexus of many fields, drawing from debates in disciplines as diverse as: geography, epidemiology, sociology, environmental science, political science, forestry, ecology, psychology, linguistics, robotics, communication, cultural studies, statistics, mathematics, conflict studies, art and design, computer science and disaster and emergency management. Sometimes it is difficult to engage a group of people from such tremendously different professional and personal backgrounds, with dramatically different views of the world and even of what should be discussed in the first place. In 2009, at the first International Conference on Crisis Mapping (ICCM), the venue where we launched the International Network of Crisis Mappers, many remarked on this lack of a shared common language. We hadn't read the same things, thought about the same problems or issue areas, or been trained in the same way. We nevertheless began to create a language and a culture for interacting with one another. At that meeting we deliberately decided as a community to try to facilitate the emergence of specific shared norms. For example, because of the extremely inter-disciplinary nature of this new area of study, we deliberately decided to make a conscious effort to avoid using domain-specific acronyms and jargon that might otherwise alienate or confuse those outside one's own discipline. As of early 2012, that language has now evolved to the point where our disagreements generate debates, code jams, simulations, and discussion around best practices. In short, the ad-hoc language we built works well enough to help inform the live practice of crisis mapping.

### **Focal Points and Strange Attractors**

Second, we have observed that these conversations tend to iterate around core issues. Discussions tend to circle again and again over predictable areas of concern. An observer of these multiple conversations would notice a striking sense of common themes across diverse communities. The "usual suspects" include, for instance: how to integrate volunteers into existing humanitarian workflows, how to ensure and enhance the reliability of crowdsourced data streams through content verification, and methods to mitigate security and privacy concerns. It seems everyone talking about crisis mapping eventually ends up arriving at a common set of questions or concerns. Such common themes are remarkable to see appear again and again across such diverse communities, from government intelligence agencies to humanitarian NGOs, from students to scholars. Individuals who have never met one another before and even live on the other side of the planet from one another are nevertheless right now making similar observations about crisis mapping's core challenges, iterating around common themes, hewing to focal points as an international culture around the practice of live mapping is being born.

Rehashing areas of concern tends to generate a common language, as frustrating as it might be for an individual to tolerate the repetition. Keywords and terms become accepted as conceptual hooks upon which we stand—a starting point for our debates

and disagreements. When the community recognizes that certain words can be used as shortcuts that spark debate, then a common language has started to emerge. Keywords and core concepts are important magnets for ideas because they help funnel conversations into coherent structures. However, language is not the only magnet or attractor for ideas. Technology itself can instigate focal points and new discussions, pushing new concerns and ideas to light. For instance, *Ushahidi's CrowdMap*, discussed below, is not only a technology platform, but also a central focus point around which new discussions and debates emerge.

### **Process and Trajectory**

A meta-analysis of the conversations around crisis mapping since 2009 reveals its own underlying dynamic driving change and growth in this field. What is the process powering these developments? How might we characterize the structure around which these conversations are taking place? We contend that this process is *not* being directed by anyone or any group. Rather, *the process is an emergent one*, driven by individuals, networks, and loose affiliations. The nature of such a process will be familiar to anyone who has witnessed a hashtag emerge on Twitter. When an event occurs, individuals in isolation decide on their own how to categorize and refer to the event. Thus, multiple hashtags initially emerge for an event. For example, after the brief power outage in San Diego county in 2011, people designated a wide variety of hashtags in the first few hours of the event to indicate they were tweeting about the power outage, including: #SanDiegoPowerOutage, #LightsOutSD #SoCalPowerOut, and many more. But this makes it difficult for someone monitoring media coverage on a specific event to find all of the information they need. A single hashtag would be helpful, but how can this emerge? Through CrowdLearning and mimicking behavior, one watches how, after a period of time, a few hashtags emerge as winners, a tipping point is reached, and many start tweeting on the “agreed upon” hashtag, taking their cue from others whom they have never met. Likewise, crisis mappers seem to have settled on a few common tags, words, and equilibria to spark the creation of common norms and social practices. Good ideas are copied, others are quickly tossed away, and the ground is always somewhat unstable beneath one’s feet.

Indeed, certain terms and ideas can be identified as focal points for discussion. These emergent crystallizations are now places where we collectively hang our conceptual hats. Such concepts help catalyze new debates and push what may be a nascent new field even further. The community, armed with some new language and concepts, an understanding of the brief history of developments in this arena, and now embedded in a socially constructed community that thinks of itself as “crisis mappers”, is forging ahead to help define the scope and shape the contours of this new area of inquiry.

Four core areas of crisis mapping have emerged: data acquisition, visualization, analysis and response. These help define the scope and core areas of crisis mapping; as such, each of these will be treated in turn (Meier 2009). Please recall as you read that each of these core areas has been defined by the community as part of an evolving, emergent process.

### **Scope**

All around the world, crisis maps are emerging to document crises as they happen, in real-time. But what do we mean by a *crisis*? What is the scope of crisis mapping? By

2011, mappers had already utilized new data and new tools to provide situational awareness during paralyzing snowstorms, fires, oil spills, tornados, hurricanes, conflicts, protests, battles, genocides, famines, and earthquakes. Slow-onset chronic conditions like poverty, homelessness, gender based violence, foreclosures and forced eviction were being mapped alongside acute disasters, and disasters can be either natural or man-made. Crisis maps thus make use of real-time information to shed light on a situation as it happens. Maps can also be leveraged to help monitor elections by allowing citizens a space to report intimidation, violence, and fraud at the polling station. Maps also may act as a witness to crimes committed by the state, such as harassment, detention or torture. As more people around the world discover the power of these crisis maps, the scope will necessarily expand to include these new use cases. Our definition of, and view about, 'what crisis mapping is' expands as new iterations emerge. But what are the recent origins of this turn toward crowdsourced crisis maps?

### **Crisis Map Data I: CrowdSourcing & CrowdLearning**

A confluence of events contributed to the development of crowdsourced crisis mapping, including the near global ubiquity of cellphones mobile devices enable users to type basic text messages or document an event occurring in real-time, by capturing the event as a picture or shooting a video. For example, Mission 4636<sup>ii</sup> was a collaborative project that helped establish a short-code whereby anyone in Haiti could text for free their needs to that number. Thus, crowdsourced event data from texts, pictures, social media and video from handheld units or computers enable people to tell their stories and place those stories on a map, in near real-time. Coupled with increased accessibility to the Internet, this new stream of data can be fed into a mapping environment or GIS platform. The rise of handheld GPS units, Google Maps, and OpenStreetMap assisted the early development of these crisis maps, as users became accustomed to making map mashups for themselves (Liu and Ziemke, 2012).

Although technology facilitated the rise of crisis mapping, it was actually *changing social practices* around the new use of these tools that drove these developments, not technology. *The crowd* continually learns from itself, by watching individual behavior and then copying and adjusting that behavior for personal preference. For example, over the past year the world has learned they can share their story about what is happening to them in real time through SMS, twitter, and other social media. During a disaster the crowd has learned from watching others to scour twitter for news: it is the place the world goes to tell its story. No single organization or network has tried to convince everyone in the world to converge on a certain set of norms or behavior. Rather, the crowd has learned to adopt these practices over time on their own.

In recent months, the crowd is also starting to learn something else. It is learning that it can quickly create its own crisis maps, even as the situation is still evolving. The proliferation of crowdsourced crisis maps occurred after Ushahidi,<sup>iii</sup> a Kenyan software company, created a free and open source customizable platform in the cloud. Anyone can create a customizable CrowdMap using any categories they like, situated on their preferred geographic extent, within minutes. Students and volunteers who worked on previous crisis map deployments learned they can help translate, geo-locate and create reports containing relevant information about all of our collective stories into an evolving, changing map, a map that is alive. The crowd has learned it can make its own map, they can jump on Twitter to learn breaking news before the news and can text

and contribute to live, real-time and georeferenced maps during a crisis. And the crowd has learned something else. Sometimes too many people simultaneously set up identical crowdsourced crisis maps about the same event. Now, when news of an explosion or event occurs, the crowd has learned to first ask: *Who is standing up the Crisis Map? Please, RT*. We have learned it is better to converge and swarm around a single crisis map; it is better to help the system find that equilibrium.

It should be noted that crowdsourced event data does not and will not replace other kinds of spatial data. Indeed, triangulation should be the goal for any empirical project leveraging crisis map data. New sources of data should be seen as an opportunity not a threat. All of the developments relayed above clearly necessitate an enhanced role for GIS experts in helping analyze and consume this data in real time. As the amount of spatial and space-time data available to scholars explodes, the need for experts across the disciplines who are fluent in spatial thinking, remote sensing, and GIS only continues to grow. Esri<sup>iv</sup>, still the industry leader in GIS applications, also recognizes the continued value and importance of spatial thinking, visualization and analysis. Analyzing and visualizing the new crowdsourced data flowing into crisis maps very much depends on the existing traditional framework and architecture. It is the base upon which new data and ideas rest.

### **Crisis Map Data II: Road Maps**

Access to effective and detailed street maps like OpenStreetMap are essential for effective crisis mapping. After all, if a volunteer in Boston receives an SOS message from someone on the ground in Haiti, *I'm trapped!*, but cannot identify that person's location on a map, he or she cannot be helped because their location cannot be found. OpenStreetMap<sup>v</sup> helped save lives in Haiti after the earthquake, as volunteers swarmed around the map to trace the latest roads, street names, tent camps, and hospitals onto the map, creating the best map of Haiti available to the humanitarian response community.

It bears repeating that effective road maps like OpenStreetMap are the *sine qua non* for effective crisis mapping.

### **Crisis Map Data III: Imagery**

Likewise, obtaining the latest aerial and satellite imagery of the crisis site is crucial for making sense of a rapidly evolving, complex environment. Traditional GIS users are already familiar with the importance of obtaining high-resolution imagery for the area of concern. For example, crisis mappers rely on those in the community who are knowledgeable about and can handle incoming files from Digital Globe, NASA, and GeoEye. When such images are not readily available, crisis mappers look for publicly available imagery on the Wikipedia of Aerial Maps, Open Aerial Map<sup>vi</sup> or fly their own satellites with help from the Public Laboratory for Open Technology and Science<sup>vii</sup>, a low-cost, low-tech participatory solution for gathering images from the sky by attaching cameras to balloons and kites. Thus, providers of roadmaps, satellite imagery, grassroots mappers and the like all have an interest and a stake in this growing research area. Promising developments on the horizon will help volunteer technical communities gain better access to essential high-resolution imagery.

## Visualizing the Information Firehose

In the space of just five short years, social scientists went from having one problem to having its exact opposite: We used to suffer from a dearth of quality event-based data. Now, we are overwhelmed by far too much data. For example, just five years ago, the author did not have enough data readily available for an event-based study of the Angolan war. In order to collect sufficient event data on the Angolan civil war for her dissertation, she had to search through archived paper files, make photocopies, and spend two years translating and coding that information. These materials now sit as paper files on her shelf. Contrast this with the plethora of real-time location-based digital information flowing through twitter, RSS, and other streams of data today. To take one example, Mission 4636 was on the receiving end of some eighty thousand SOS text messages from people on the ground in Haiti in need of assistance. And this is only just the beginning. How can we cope analytically and organizationally with this new stream of data? The report, *Disaster Response 2.0*, refers to this problem with an incredibly apt metaphor: the “problem is like trying to take a sip of water from a firehose” (HHI 2011).

How can analysts begin to detect the signal from the noise in all these data? How can we verify and validate the data, visualize the data in all its complexity, find patterns and trends, test hypotheses, and detect significant changes of interest to the end-user, in a high-pressure real-time setting? The goal may be to detect what events might be important, and connect the overwhelmed, overworked person on the ground to just the right piece of information that might help save a life. This is a difficult task and one not limited to mapping and visualization. After all, these complicated stories have many attributes, and spatial location is only one of them. Thousands of red dots on a 2-D map may not help one “see” patterns and identify needs. Standard GIS platforms ably use layering and other animation functions to display complex space-time data. Though heat maps may be instructive as a first look, the quest is always on for new and creative ways to visualize complex data.

Epidemiologists, criminologists, and scholars in environmental science have long dealt with complicated space-time event data, and crisis mappers are eager to borrow best practices and lessons learned for advances in visualization and analysis of event data. For example, Oculus’ unique program, GeoTime<sup>viii</sup>, deploys the dimension of time on the z-axis, a third dimension, allowing one to see patterns and connections in space-time data not detectable on a two-dimensional map. Other ideas include leveraging the power of sound (sonification) insofar as it allows us the ability to simultaneously experience another attribute of the data (see, for example, Geere 2010; Meier 2009b). Taken together, these steps may be the most useful antidote to our current affliction, born out of the excitement over crowdsourced crisis maps: red-dot fever. The visualization of complicated, complex, nuanced datasets is thus a burgeoning and important new area of concern and three dimensional interactive visualization tools of complex datasets represent the bleeding edge of developments in this field.<sup>ix</sup>

## Crisis Mapping Analytics

Social scientists know that sometimes our eyes think they detect patterns that are nevertheless not statistically or substantively significant. Thus, visualizations alone do not constitute a sufficient test of one’s hypothesis. This is why we need crisis mapping analytics. Scan statistics can be used to identify statistically significant clustering

(Kulldorff 2006), and other statistical tools are available for the analysis of crisis map data in programs such as GeoDA<sup>x</sup> or ArcGIS. However, we need new methods and tools to help test and detect relationships and answer new questions. To take just one example, we need tools that can detect whether an event taking place at a certain time and place will affect a different event at some time in the future. For instance, there might be a relationship between losses on the battlefield and subsequent and proximate civilian mass killings (Ziemke 2008). Or one might have reason to believe that looting in one place might be related to the volume of food and water requests.

These are just some example of the many questions that researchers might have regarding whether endogenous relationships exist between and among *different event categories* in the dataset, and how we might begin to detect their strength and statistical significance. New techniques to cope with the unstructured datasets at different scales and levels of resolution would be warmly welcomed, as well as advances in machine learning and computational and agent-based modeling. Innovative work mapping insurgent activity and detecting patterns through the lens of complexity science is another fruitful development (Johnson, 2012).

### **The Raison D'être of Crisis Maps**

Why make crisis maps? The purpose of the map is typically defined by the end user. Since crisis maps can be used by any person or organization in the world, there may be as many reasons to deploy a crisis map as there are maps. However, we may generalize crisis maps into some basic categories according to their purpose.

### **Humanitarian Response**

When formal humanitarian aid and emergency response communities create a crisis map, as UN-OCHA did in order to monitor the crisis in Libya, the purpose of the map is to provide the agency with the necessary context and information it needs to help formulate and inform its response. During a rapid-onset, complicated disaster situation, aggregated, geo-referenced, real time event data offers first responders improved situational awareness in a complex and changing environment. First responders, urban search and rescue teams, and the humanitarian disaster management community place information at a premium, particularly during the critical first 72 hours after a mass casualty event occurs. After a large and disastrous earthquake in Haiti, for example, teams needed to know which roads were passable and which were closed, in order to effectively route aid and response into the area. Crisis maps may also be used to help identify gaps in service provision. Where are food and water requests concentrated? Where are existing distribution points?

### **Where There Is No Internet**

It is important to remember that citizens may lose access to the Internet and use of cellphones during a crisis. In some places, these options were never available in the first place. Therefore, the continuing importance of local media, ham radio, conventional radio, and paper and pen is readily apparent, and dialogue and best practices continue around the importance of keeping low-tech solutions a key part of the practice. To take two examples, Internews<sup>xi</sup> highlights the importance of local radio, instrumental to disaster response in Haiti, while Walking Papers<sup>xii</sup> enables people to print paper maps, walk around and make edits that can be scanned back into the system.

## Crowdfeeding

Another *raison d'être* for a crisis map is to help connect the crowd to itself. Such peer-to-peer connections are necessary because the crowd is its own best first responder in situations where conventional resources and traditional structures are overwhelmed by requests. For example, most people rescued from under the rubble in Haiti were saved by their neighbors, due to the overwhelming number of people trapped. Crisis maps can help citizens make these important connections.

Critically, mappers are now creating crisis maps with both categories for the SOS as well as the offer of help. For instance, after snow storms buried the East Coast of the United States in 2010, trapping many people in their homes, the “Snowmageddon” map<sup>xiii</sup> allowed users the ability to both register their need for help as well as offer assistance and solutions: *we have a shovel to share*. Ushahidi’s Crowdmapper additionally allows citizens to sign up to receive alerts by text message or email about events of interest in their area. Effective crisis mapping necessitates closing the communication loop by supplying information back to the crowd, since they are the ones populating the map with information in the first place.

## Hypothesis Testing, Trend Detection, and Event Early Warning

Maps can also be used to detect trends, test hypotheses, and create alerts useful for conflict and disaster early warning. Disease, conflict, and wildfire maps that preserve their recent trajectory lead to questions like: Where is the disease or fire headed? We can use animated crisis maps to create expectations about how these trends look and where they are going in space and time. Thus, maps can be used to detect patterns and trends as one part of an analyst’s early warning toolkit. Epidemiologists have long used event-based statistical models to explain and predict trends and test hypotheses related to the spread of infectious disease. Fire departments have also developed sophisticated visualization and analytic capabilities to ascertain in which direction a fire is likely to burn, how far and how fast. Research in each of these fields will help inform current debates and generate fruitful innovations and ideas.

## Testimonial Maps

Maps can also be used as a witness, to help shed light on human rights abuses, intimidation corruption, poverty, violence, and discrimination. The name *Ushahidi*, the Kenyan-based company behind so many crowd-sourced crisis maps means *witness* in Kiswahili. Crisis maps allow people to tell their stories, even stories that some regimes try to deny or repress. Right now, for example, the Syrian regime denies that civilians are being tortured and imprisoned. The crisis map “Syria Tracker” is a living document of the thousands of voices that claim otherwise and wish to document their own version of the story. *I was tortured; I was wrongfully imprisoned; I witnessed ballot boxes being stuffed outside the polling station*. Maps can also be used by human rights organizations to help monitor repressive regimes. If the regime shuts down access to the Internet, or restricts foreign intervention, there is a work-around: Volunteers can be mobilized to comb thousands of satellite images, helping detect evidence of forced evictions, troop movements, and mass graves. Satellite Sentinel<sup>xiv</sup> monitors Sudanese troop movements in anticipation of continuing tensions in the Sudan. Will a watching world serve as an effective deterrent, stopping atrocities in their tracks?



## **The Cat Is Out of the Bag**

The crowd is learning to tell its story via multiple media points and then collect them on crowdsourced crisis maps. The process is an emergent one driven by everyone and no one in particular. The crowd has learned to make maps without knowledge of GIS, the Crisis Mappers Network, or extremely important discussions around security, ethics, and content verification. As explosions shook Mumbai in 2011, twitter was ablaze with offers of help, shared spreadsheets, content curators aggregating hashtags on the subject, and questions regarding “who is making the map.” Attempts can be made to tame, to pull, to shape this trajectory, but crisis maps can and will be created by anyone, anywhere, for free. The cat is out of the bag.

## **The Puzzle of Participation**

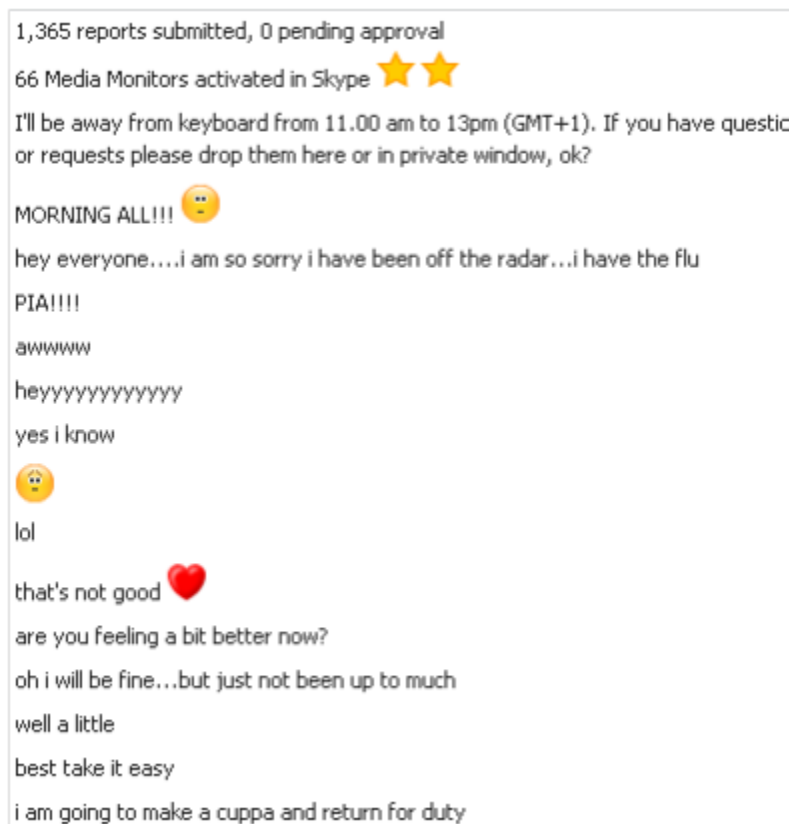
When someone texts or tweets their story out to the world, it is important to note that these stories do not magically appear on a map. Rather, successful crisis map deployments depend on volunteers, local and global: to read, translate, georeference, and thus create reports that turn into discrete events on a crisis map. The process is not automatic, but depends on hours of cutting, pasting, and sometimes frantic searching, in a real-time environment. These volunteers do this work for no pay, and often stay up all night in their enthusiasm to help, albeit from a remote location.

Around the world, in nearly every time zone, volunteers are engaged in the often repetitive, stressful and trauma-inducing act of live crisis mapping for disaster or humanitarian response. They are watching YouTube videos of slaughter, writing code, georeferencing and verifying reports, tracing roads, translating messages, and following specific sources from which to create reports to improve the collective, web-based map. (Learn more about the infrastructure you need to create a successful crowdsourced crisis map from the flagship online volunteer community for live mapping, the Standby Task Force<sup>xv</sup>).

These volunteers live everywhere around the world and form a virtual community of engaged volunteers and they are their own support mechanism. Through an emergent process, the volunteers of the Standby Task Force have established a reputation long ago for being very warm with one another. This volunteer community has learned to play nice, and be supportive of one another, because creating reports about these events day after day takes a psychological toll. Secondary trauma, burnout and fatigue remain a concern for these volunteers, though they may be thousands of miles from the crisis. No one told them to play nice or to use one another as a support group, but the emergent process that is collaborative crisis mapping started creating solutions before anyone even articulated the problem (Figure 1).

What can explain the remarkable participation of these volunteers? After all, much of the literature in social science assumes that we can treat individual decisions as if they were motivated by rationalist considerations that at first glance would seem to contradict the behavior we observe here. People who already have jobs and many other responsibilities, are working tirelessly through the night, for no pay or recognition, to help someone on the other side of the world whom they have never met? What is happening here?

Literature on game-play may provide unique insight into their behavior. In her seminal new book, *Reality is Broken*, Jane McGonigal is puzzled by similar behavior: Why do people stay up all night playing video games, after a long day of work? She argues that in the modern era many people are not sufficiently challenged and stimulated at work. People work not only for money, but want to do something that satisfies their desire to do something useful and fulfill their life's purpose. Because our day job may not be satisfying enough, or mundane, or doesn't ask enough of us, we have turned to games, playing millions of hours collectively per year. McGonigal asks, what if these hours spending time playing games could be leveraged for social good? (McGonigal, 2011).



**FIGURE 1** Volunteers around the world help one another via Skype chat.

### **THE INTERNATIONAL NETWORK OF CRISIS MAPPERS**

The *International Network of Crisis Mappers* (<http://crisismappers.net/>) is an active, interdisciplinary community of practice whose conversations continue to create and shape how we collectively understand crisis mapping, both in theory and practice. Our community is a neutral place to have discussions across agencies, domains, and cultures. We are a network that grew from our modest beginnings as a group of 100 at the first International Conference on Crisis Mapping in 2009 to nearly four thousand individuals who have collective work experience in every country on earth and who currently reside in over 160 countries.

The network grew because there was a space to fill: the lack of crosscutting forums around which to have these needed discussions, and the siloed nature of disaster response helped facilitate its growth. The crisis mappers list-serv facilitates conversation between and across diverse organizations, that have all descended simultaneously upon the disaster area, but all have their own unique structure, goals, routines, hierarchies and information channels. As such, we are a place where members of over 1,500 different institutions and organizations are able to talk about the issues described here.

## **Community Vision**

Our community is open to anyone. However, we are upfront about the norms we are trying to promote. Those norms include: “share until it hurts” with “as much openness as you can stand.” That means we hope people find ways to share code, imagery, documents, syllabi, ideas, articles, or algorithms. Crisis mappers thus share a natural affinity with the open data, open licensing, and the open source software community.<sup>xvi</sup>

There is already a sense that crisis mappers have a shared history, but only a small fraction of the conversation and the practice of live crisis mapping has been documented. Ensuring that we continue learning from past and current crisis map deployments will be critical to ensuring the continued evolution and development of these ideas. In addition, in order to ensure continued development in this area, legacies of practice and core concepts need to be traced and commonly defined. In order to ensure forward movement in an evolving, asynchronous, community debate, we need to find ways to ensure the new voices brought into this community know the historiography of this rapidly evolving recent practice and burgeoning debates.

A persistent concern inherent in horizontal networks is the asynchronous nature of overlapping conversations that are so critical to capture in the development of these new conversations. Unfortunately, only a limited number of people can meet and take part in the many concurrent, overlapping and multiple discussions in this space. Meetings and conferences in some way relevant to crisis mapping have emerged nearly every week all around the world. Important discussions that would otherwise move these debates forward have been lost because, by definition, only a small proportion of people who have a stake in these issues were “in the room” at the time of the discussion. Interviews will be essential to document and record this history. What can we learn from volunteers, practitioners, and affected populations about the use or effectiveness of crisis mapping? How do our student volunteers come to understand this new term? How has the crisis mapping community’s perception of what crisis mapping “is” evolved over time?

Norms and practices drawn from other disciplines would help inform these debates. Established journals, together with respected blogs and other fora may provide one avenue for such collective learning and sharing. Open-access academic articles, journals and books are crucial for ensuring that the conversation that forms the heart of any disciplinary study is recorded and moves forward. Academic outlets are the essential link that ensures that important advances are documented and widely read, sparking debate and continued community participation in the dialogue developing this arena of inquiry. However, we need find a way to ensure critical debates move forward and we are able to share our work as soon as it is complete, and not have

research sit behind a paywall or ten months under review. This is true, particularly for a research area in which theory and practice are so closely intertwined, and where latest ideas and concerns can lead to a change in the practice of crisis mapping in real-time. It is essential to find mechanisms that encourage the rapid dissemination of scholarly articles, where real-time information and insight is critical to core conceptual development. The incentive for sharing is this: it is the only realistic chance you have to get your voice and ideas heard in this new space. If you don't, the wave will simply pass over you. Openness is the new competitive.

The Harvard Humanitarian Initiative and UN-OCHA are engaged with the International Network of Crisis Mappers and other communities in the ecosystem to help define next steps, particularly as they pertain to crisis mapping for disaster response. The report, *Disaster 2.0*, and the criticisms outlined in *Disaster 2.1*, describe the need to create safe places where people can brainstorm, innovate, and engage in simulations, even though such work on the bleeding edge might initially fail. (Harvard Humanitarian Initiative 2011; The Standby Task Force 2011). We look forward to continued discussion with many overlapping communities, in a diverse fora. The self-organized sessions at the annual International Conference on Crisis Mapping (ICCM)<sup>xvii</sup> are one of the places where the community can brainstorm best practices and lessons learned, and develop codes of conduct for the ethical and sensible deployment of live crisis maps.

## Resources & Education

Universities around the world are showing interest in these developments by bringing new courses into their curricula. In addition, a number of universities are actively engaged in creating programs in crisis mapping at both undergraduate and graduate levels, including discussions around developing new majors, certificates, and minors, and associated curricula and courses. Students are both eager to participate and thirsty to be theoretically engaged in the debates. Their participation will contribute to core conceptual development.

Lessons learned from engaging in previous crisis map deployments informed the development of my course, *Crisis Mapping, New Media and Politics*. Please see the following resources for information related to this upper division university class, including: course resources<sup>xviii</sup>, syllabi<sup>xix</sup>, overview material<sup>xx</sup>, videos<sup>xxi</sup>, & webinars<sup>xxii</sup>. This course was taught at John Carroll University during both the spring and fall semester of 2011.

These resources are openly shared with the community in order to make it easier for faculty to develop their own courses on the subject, and to help formalize the academic study of the subject by suggesting one way to organize the many overlapping threads that form the framework of this new research area. Tufts University, at the forefront of crisis mapping after the Haitian earthquake, is another strategic center for the practice and study of crisis mapping. Tufts offered a 1-credit course on the subject during the spring of 2011. We also welcome the development of initiatives like *Universities for Ushahidi* [U4U<sup>xxiii</sup>], and the trainings at TechChange, insofar as they offer ideas and a structure for future course development and help train future leaders in this area.

Are these discussions cohering into a new interdisciplinary field or subfield? How might one situate these new conversations and practices into debates within other disciplines? A number of universities are already teaching courses on crisis mapping, and some are developing new major and minor programs in the area. If this does not signal the dawning of a new field, how might we best view these developments? It is my contention that an examination of the meta-trends and emergent core concepts reveals enough conversations are coalescing around coherent concerns and debates to justify the birth of a new field.

The birth of crisis mapping as a concept, theory, and practice, depends upon an emergent process, reflective of the way in which the global community learns and continues to refine the norms and procedures for operational crisis mapping. The development of a common language and frames of reference continue to be defined and constructed as a series of debates and adopted best practices learned from experience. Certainly we are only at the beginning of a long journey. I look forward to taking next steps with you.

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- <sup>i</sup> <http://crisismappers.net/page/3244260:Page:3672>
- <sup>ii</sup> <http://www.mission4636.org/>
- <sup>iii</sup> <http://ushahidi.com/>
- <sup>iv</sup> <http://www.esri.com/software/arcgis/index.html>
- <sup>v</sup> <http://www.openstreetmap.org/>; <http://hot.openstreetmap.org/weblog/>
- <sup>vi</sup> [http://www.openaerialmap.org/Main\\_Page](http://www.openaerialmap.org/Main_Page)
- <sup>vii</sup> <http://publiclaboratory.org/home>
- <sup>viii</sup> [www.oculusinfo.com/geotime/](http://www.oculusinfo.com/geotime/)
- <sup>ix</sup> [openantz.com](http://openantz.com)
- <sup>x</sup> <http://geodacenter.asu.edu/about>
- <sup>xi</sup> <http://www.internews.org/about/default.shtm>
- <sup>xii</sup> <http://walking-papers.org/>
- <sup>xiii</sup> <http://www.snowmageddoncleanup.com/>
- <sup>xiv</sup> <http://hhi.harvard.edu/programs-and-research/crisis-mapping-and-early-warning/satellitesentinel-project>
- <sup>xv</sup> <http://blog.standbytaskforce.com/>
- <sup>xvi</sup> <http://www.osgeo.org/>
- <sup>xvii</sup> <http://crisismappers.net/page/3244260:Page:3672>
- <sup>xviii</sup> [www.jenziemke.wordpress.com/](http://www.jenziemke.wordpress.com/)
- <sup>xix</sup> <http://crisismappers.net/page/education>
- <sup>xx</sup> [https://docs.google.com/presentation/view?id=0AW3aiDauTC9nZGc5azV4empfMTI3OWhuNTluOXdm&hl=en\\_US](https://docs.google.com/presentation/view?id=0AW3aiDauTC9nZGc5azV4empfMTI3OWhuNTluOXdm&hl=en_US)
- <sup>xxi</sup> <http://crisismappers.net/video>
- <sup>xxii</sup> <http://crisismappers.net/profiles/blogs/links-to-all-webinars>
- <sup>xxiii</sup> <http://u4u.ushahidi.com/>