

Turning the Spotlight on the Crowd: Examining the Participatory Ethics and Practices of Crisis Mapping

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Abstract

'Crisis maps' are crowd sourced web 2.0 maps designed to respond to natural disasters and escalating political conflicts. They are archetypal web 2.0 maps: interactive, dynamic, public, fuse together different information streams, and can employ both custom-built professional platforms and homemade software. Crisis maps work by georeferencing events that occur throughout a crisis, such as reports of damage, needs and casualties or protests, fights and arrests. Data sources are diverse and range from news broadcast by traditional media outlets and NGO press releases to geotagged Twitter reports, YouTube videos or SMS text messages. Hence, at least potentially, any person connected by mobile phone or internet can participate in the generation of crisis maps. Crisis maps appeal explicitly to a



participatory ethic in order to help those in need. Drawing upon an explorative sample of crisis maps, this paper shines a critical spotlight on notions of participation in crisis mapping discourses, looking at different sorts of crowds participating; the rhetoric that draws them in; and the practical ways in which people contribute to the maps. The paper concludes by questioning imaginations of crisis maps as a participatory bottom-up representation of 'ordinary voices' on the ground.

Introduction

As the ground rumbles with an earthquake; mortars explode on the edge of town; or floodwaters begin to lap at the bottom of the stairs, those people whose lives are threatened or disturbed by the events need to communicate. They seek to get the message out that they need help; are available to help; or simply let other people know what has happened. Even more urgent is the desire for information about the event from outside: when, where, and why is it happening? How great is the damage? How long will it last? In recent years a new way of collecting and communicating information about crises has been emerging through the internet: the crowd-sourcing of crisis maps. Crisis maps are websites where information about a crisis event – be it natural catastrophe or political conflict – is collated and presented on a map. The most simple of crisis maps links events with locations and puts symbols on a map to show where these events occurred (see Figure 1).

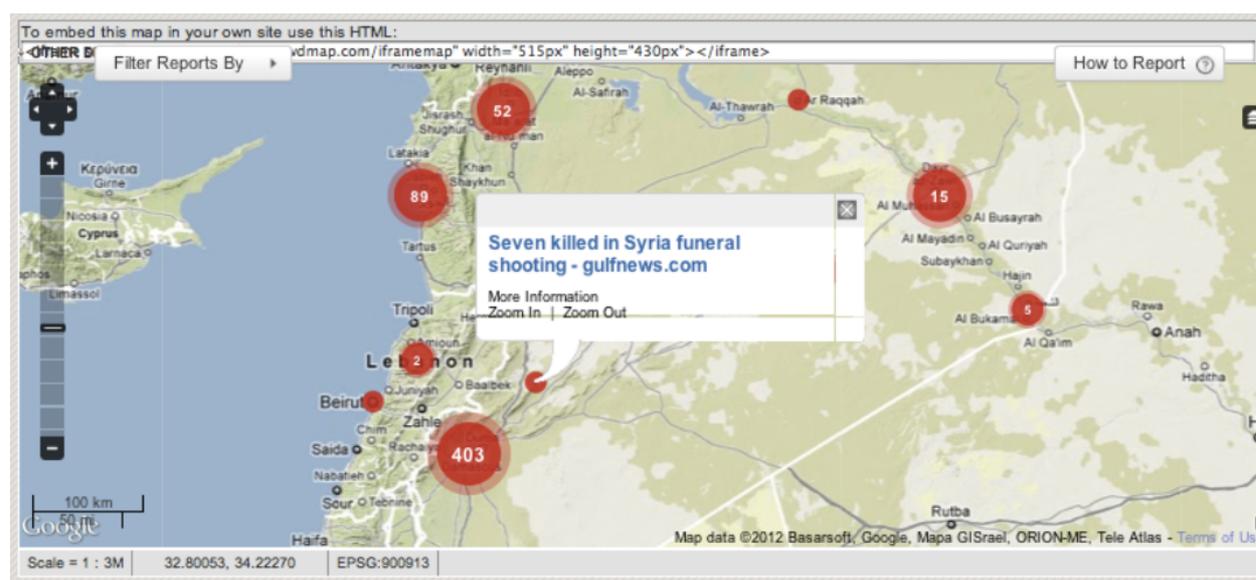


Figure 1. An example of a crisis map, the 'Syria Tracker' map. Each report becomes a dot on the map.

Information may be pooled from various sources: official governmental disaster relief/humanitarian agencies; NGOs; the media and, most importantly in the context of this paper, 'crowd-sourced' from the general public. Most maps enable anyone with mobile phone or internet connection to submit information that is added to a map. Contrary to older, centralized ways of sharing information on crises (such as public radio or press releases by state-agencies) crisis maps promise bottom-up participation and a departure from the hierarchies of the state as the responder and communicator in crises.

In this paper we elaborate on the emergence of this new form of crisis communication through participatory mapping, focussing on participation and agency. We consider: 1) the expectations that have been raised about crisis mapping in media coverage and promotional

rhetoric; 2) mapping practices to determine how people participate and who this might include or exclude; and 3) finally we consider what these maps look like and how they visually present the collaboration of a crowd.

After all, this sort of map is radically different from the traditional form of paper map that, until recently was the common understanding of a map – a static representation of space. ‘Crisis maps’, in contrast, are an archetypal example of what has become known as web 2.0 mapping (described in Haklay et al, 2008; see also Gartner, 2009). These technological developments open up new possibilities for how maps can be made and what maps look like. Rather than officially produced by government mapping agencies, publishing houses or the military, anyone with access can ‘publish’ a map in the web. Rather than being static snapshots from the time of assembly, geoweb maps can be continually updated. And, rather than being the assembly of data selected by the publisher, web 2.0 maps can, so the rhetoric goes, represent the ideas and observations of many autonomous reporters.

Hence, as Burns and Meek point out in a recent ACME Geoweb issue: “knowledge politics and participation have both been cornerstones of critical geographic approaches to studying the geoweb” (Burns & Meek, 2015:787). In their review of this technological shift, Haklay and his coauthors (2008) ask “what kind of participatory practices are emerging “...” and how do they influence the relationship between people and places?” (Haklay, 2008: 2035). Questions we address here, as we focus our spotlight on the ‘crowds’ that engage with crisis maps. The collaborative practices of crisis mapping enable the publication and combination of information in new ways, potentially altering how crises are understood and responses are conducted. The discourse of public participation and interactivity is not only central to web 2.0 technology, it is also a key element in catastrophe and crisis management literature which aims to build ‘resilience’ within communities and increase lay involvement in all phases of the disaster management cycle. A practical assessment of how crisis maps have been used on the ground is beyond the reach of this paper. Instead our aim is to challenge the claims surrounding participation and empowerment in crisis mapping discourse and the underlying sentiment that the inclusion of the ‘crowd’ erases the problems of cartographic representation and older modes of map production.

Our analysis is therefore inspired by a body of literature within critical cartography that examines maps and mapping projects with respect to questions of power. Scholars such as Brian Harley (1989); John Pickles (1995; 2004) and Dennis Wood (1992; 2010) have revealed how maps have been produced for political ends; how map use empowers certain authorities and sorts of knowledges; and further how the visual appearance of maps creates certain political propositions. One response to the critical exposure of these political facets of maps has been the rise of a ‘counter-mapping’ movement (Peluso, 1995) that through the explicit inclusion of disadvantaged groups in mapping projects seeks to overcome power-imbalances that result from the hegemonic production and use of maps. There is an implicit assumption with the promotion of web 2.0 mapping that fundamental criticisms of cartography voiced by critical cartography and critical GIS scholars, suggesting professional cartography and GIS is highly technical and services elites, can also be answered through collaborative and open exchanges of data and production. We look at participation in crisis mapping to see how these promises are playing out in practice. Theorists of participation also lead us to consider: might participation in crisis mapping cohere with the more general critiques of Cooke and Kothari (2001, cited in Kindon & Pain, 2007, 2008) that participation can be “instrumentalist” and “guilty of entrenching rather than destabilizing traditional hierarchical relations?”

We thus open up crisis mapping to questions of politics and power, drawing on empirical analysis of a selection of crisis maps from 2011. Rather than focussing on a detailed examination of one map, our paper covers a range of examples to show the diversity of practices known as ‘crisis mapping’. Crisis maps evolve from crisis to crisis, particularly as success stories about the creation of maps in one context inspire others to make new maps as new crises arise. Different crises have led to different sorts of maps – some made by anonymous individuals, some supported by established institutions for disaster response. Natural disasters require different sorts of information and differ in purpose from maps of political conflicts. Maps that support local responses to a crisis differ too from maps that inform a larger audience outside the crisis zone. In each case the nature of participation can also vary due to factors such as digital divide, literacy, and the sorts of resources available. Nonetheless, common across all crisis maps, is that they are in some way designed or intended to facilitate and represent the input of a crowd.

Hence our selection of case studies has been guided by the desire to show diversity, but also to draw out this common popular rhetoric surrounding crisis mapping. The case studies that follow are not intended to compare or evaluate the mapping examples, rather to highlight shared logics and tropes emerging within this field. We include maps depicting crises in the first world; the emerging world; civil conflicts; and natural disasters. Our examples, as listed in Table 1, are: Queensland Flood map; Bushfire Connect, Libya Crisis Map; Syria Tracker; SyriaMarch15. They represent variously the work of anonymous actors, local groups, international groups and established media organisations.

<i>Map</i>	<i>Context</i>	<i>Crisis zone</i>	<i>Creators</i>	<i>Example of 'crowd' participation</i>	<i>Website</i>
Queensland Flood Map	Natural disaster	Queensland, Australia	Media Organisation	Lurkers (onsite) Reporters	Queensandfloods.crowdmap.com
Bushfire Connect	Natural disaster	Australia	Local voluntary group	Ambient reporting Maintaining a map	bushfireconnect.org/ushahidi/
Libya Crisis Map	Civil conflict	Libya	Online volunteers & UN agency	Maintaining a map	Libyacrisismap.net
Syria tracker	Civil conflict	Syria	Online activists/ volunteers	Maintaining a map Setting up a map	Syriatracker.crowdmap.com
Syriamarch15	Civil conflict	Syria	Anonymous activists	Setting up a map	Syriamarch15.com

Table 1. Summary of examples used

Case studies are based on qualitative research methodology examining the processes of map making in each context, as well as quantitative analyses of map data. Where possible interviews have been conducted and supporting literature in the form of post-deployment evaluations and reflexive accounts has been used to deepen the analysis. Again, we stress that the nature of our sample is explorative rather than representative and intended to engage a critical debate on the participatory aspects of crisis mapping discourses.

When describing participation, we should bear in mind the different social and economic contexts in which crisis maps are produced and used, such as varying access to technological resources, varying (map)literacy and the kinds of relations between helpers mapping in one context and crisis victims mapping in another. Most of the crisis mapping projects here apply similar practices and technologies, seek to engage with bottom-up humanitarian response and bear some degree of participatory promises through crowdsourcing. Those general commonalities could be considered as a crisis mapping discourse, which is the actual focus of this paper.

Our analysis consists of three parts. Firstly, we consider how the crowd is present in descriptions and justifications of crisis maps: how are crisis maps being presented as the work of the crowd? Secondly, we explore mapping practices to show different modes of participation and consider what sort of information is being ‘crowdsourced’ and how people contribute to maps. Thirdly we consider how participation is visually reflected in the maps themselves. Taken as documents, what does the average participatory web 2.0 map look like? How does the mashing together of dots on a map reflect the participation of a crowd? The online map is the most obvious outcome of crisis mapping projects but we want to go beyond the map too, to consider broader effects of collecting and presenting crisis information in this way. In doing so we return to question the promotional claims that define crisis maps as participatory and the product of the crowd.

Part 1. ‘Ordinary people have a voice’ - The Rhetoric of Crisis Mapping

As a first step we explore the ways in which participation is being defined through descriptions of crisis maps and the communities who make them. Crisis mapping is often framed as a good news story about bad news. Offering a way of improving responses to disasters, stories about the instigation and implementation of crisis maps have generally been positive. A Newsweek blog article about the use of crisis mapping following the 2010 earthquake in Haiti, for example, explicitly describes ways in which these maps have saved lives:

[Crisis mapping] provides a way for volunteers to collect information from sources like text messages, blog posts, videos, phone calls, and pictures, which are then mapped in near real time. It can be used to plot everything from disasters to wars. ...is advanced enough to paint an accurate portrait of events while remaining incredibly user friendly and easy to build on. The end result is a crisis map that provides humanitarian actors on the ground an overview of the situation. Even in a country like Haiti, where technology is sketchy at best, [it] has been pretty incredible, saving countless lives. (Ramirez, 2010)

Accurate, useful, easy, and helpful even when ‘technology is sketchy’ crisis mapping is defined through articles like these as a worthy way of responding to a crisis – ‘everything from disasters to wars’.

The central idea of participative crisis maps is that there are eyewitnesses, those on the ground, seeing and experiencing and then providing new information by sms-ing, calling, tweeting, posting a video or filling out a web form. Each report can lead to a new dot on the map – thus their participation is recognisable on the map. A popular software platform for crisis mapping, is called ‘Ushahidi’ referring to these ‘witnesses’ in Swahili. The story of the original Ushahidi map of violence in Kenya in 2008 is one of the founding narratives of crisis mapping, gaining prominence through their development of generic crisis mapping software (ushahidi.com). An earlier collaborative map, the Scipionus map following Hurricane Katrina in 2005, enabled viewers to add placemarks with information to a google map. It was hailed

as ‘a public document of astonishing detail’ (Singel, 2005). As ‘wired’ reported at the time, “all of the information has been provided by ordinary citizens, most of whom presumably have come to the site in search of information themselves”. Jonathan Mendez, one of the instigators of the map, said he was inspired by the idea that “journalism is going to the people” (quoted in Singel, 2005).

This idea that crisis maps are the product of ‘ordinary citizens’ pooling their expertise is a key theme in the rhetoric about crisis maps. The website for ‘Crowdmap’, a user-friendly version of the Ushahidi software, has the sub-heading:

Ordinary people have a voice, and interesting things happen when you aggregate those voices and visualize the results. Surprising information and insights can be found. (<https://crowdmap.com/mhi/page/4>).

The claim to engage ‘ordinary voices’ echoes claims about the democratizing potential of web 2.0 technology in general, as well as aligning with a more general liberal rhetoric. This is extended from the ‘ordinary voices’ to the information itself: because these maps are public, the information collected is also freely accessible. Ushahidi’s Ory Okolloh, notes that ‘at the heart of Ushahidi is the idea of liberating information’ (Okolloh, 2009, cited in Liu and Palen, 2010, 87).

Indeed crisis maps are often portrayed as an alternative to official coordination efforts and official maps. Patrick Meier, one of the Ushahidi founders and co-founder and coordinator of the Crisis Mappers Humanitarian Technology Network, reflects that “during the massive Russian fires of 2010, volunteers launched their own citizen-based disaster response agency that was seen by many as more visible and effective than the Kremlin’s response” (Meier, 2012). In its report ‘Crowdsourcing Crisis Information in Disaster-Affected Haiti’, the US Institute for Peace (Heinzelman and Waters, 2010) contrasts the crisis mapping response with traditional humanitarian aid responses. These commentators are enthusiastic about how crisis mapping can complement the traditional response by the state or larger relief agencies. So too, Meier’s snappy sound-bite: “crisis mapping is to humanitarian space what x-rays are to emergency rooms” (Meier, 2009) suggests the technology brings something new, something life-saving, something with analytic capabilities but also something that has a legitimate place in the ‘operating theatre’ of humanitarian space. Crisis mapping brings ordinary voices, alternative voices, into a space where life and death decisions are made.

Naturally, this sort of rhetoric about the legitimacy and utility of crisis mapping helps to bolster participation. If the maps are reported as making a worthwhile contribution to relief efforts and awareness raising, then people are inspired to help make them work. As we will explore in greater detail in Part 2, crisis maps are often set up by groups of volunteers collaborating online from areas unaffected by the crisis. Crisis maps as community-driven initiatives tie in with a current policy trend within crisis management that seeks to restructure the community/government interface and promotes a rhetoric of ‘sharing responsibility’ in disaster management (McLennan & Handmer, 2011). Several authors have noted that crisis mapping platforms are part of a shift from the ‘one-to-many’ model where “foreign journalists and aid workers jet in, report on a calamity and dispense aid with whatever data they have” (Giridharadas, 2010), to a new paradigm of ‘many-to-many’ where information is exchanged between affected communities, across government and humanitarian agencies in a continuing dialogue (see Roche *et al*, 2011, for a more detailed description; also ‘Ripe Intel’, 2011). These maps as such demonstrate a key feature identified in social media and web 2.0 interaction, that of a blurring between the roles of producer and consumer /user – see Toffler’s (1980) construct of ‘prosumer’ and Bruns’ (2007) ‘produsage’. The interactive

exchange of data promoted through crisis maps engages people to be at the same time producers and users of information.

Yet this blurring of the boundaries of who is providing, curating and using information is precisely the reason why it is important to shine the spotlight on the crowd. It is important to know who is (and isn't) able to participate in crisis mapping and how they participate, in order to determine just how liberating, 'ordinary', alternative or community oriented these maps are. Which communities do they represent and which do they serve? The rhetoric about crisis mapping establishes ideals about how and where these maps can be useful, but to determine exactly what the 'crowd' contributes and how participation is possible through these projects we need to consider crisis mapping practices. In the next section we therefore turn to several examples of crisis maps and the practices of crisis mapping.

Part 2: How Crowds Map

A fundamental step in analysing participation in crisis mapping is to break down the notion of the 'crowd'. There are in fact several 'crowds' implicit in the concept of crisis mapping. Currion (2010) identifies two: 1) those who enter 'eyewitness' data in a map; and 2) those who volunteer to help with the administration or coordination of these maps. We agree that these groups represent quite different sorts of participation and also want to bring in a third major 'crowd' – the audience that view and use maps online, into consideration. Through an analysis of crisis mapping practices we have developed a typology of engagement, describing the different ways in which people participate in a map. Participation ranges from passive viewing of a website (which nonetheless requires a degree of interaction through zooming, scrolling and clicking on things) to setting up a map and beyond. Thus there is a continuum of participation, or range of ways in which an 'ordinary' someone may contribute to the map (see Figure 2):

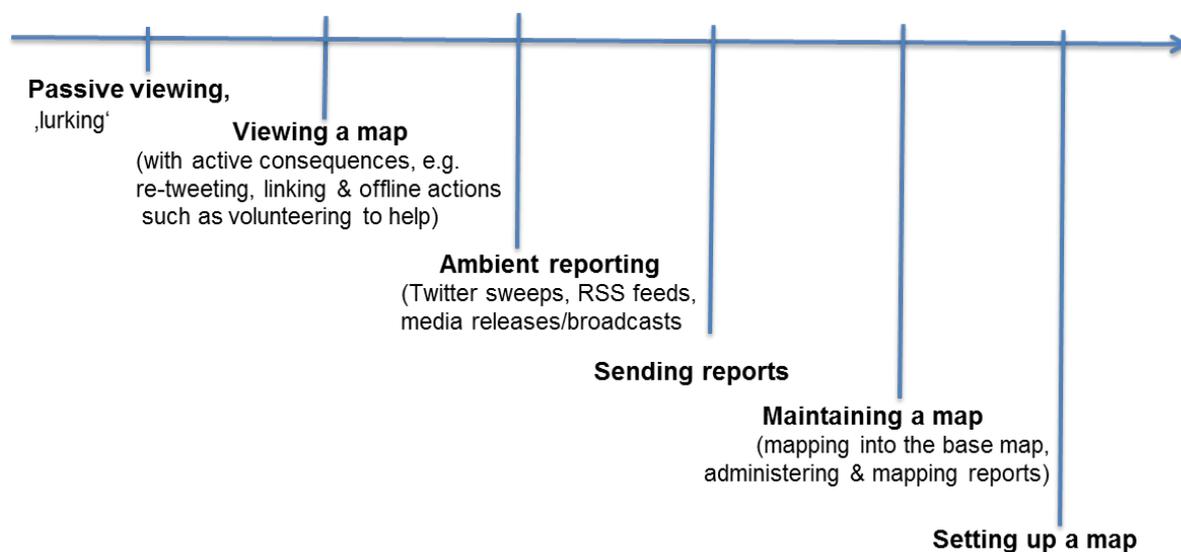


Figure 2. A continuum of participation in crisis mapping

The process of compiling together multiple voices – be they 'ordinary', alternative or otherwise – and publishing a dynamic map is a relatively new idea, enabled through the technological possibilities of web 2.0. Thanks to the development of specific software for this purpose, the skills required to both initiate a map and contribute to it are, in theory, relatively low. The capacity to participate varies considerably depending on status and position within the networks producing the map (Bittner et al., 2013). Participation is subject, of course, to

access to the relevant technology, such as a telephone, smart phone or some form of computer etc., as well as requiring a certain degree of literacy, including computer literacy.

In this section we examine this range of practices through a series of crisis maps. As stated above, examples have been chosen to demonstrate a range of applications of crisis mapping yet a commonality in mapping practices. This paper is not a comparison between the maps or evaluation of the merit of the mapping practices of one deployment compared to another. Rather this review demonstrates the range of actors (or crowds) involved in instigating, maintaining and contributing to mappings of crises, along a continuum of different forms of participation.

Passive viewing

Those who view crisis mapping websites, as ‘passive’ viewers are at one end of the participation spectrum. This audience may be the immediately affected public (i.e. those directly at the location of the event), but it could also include family and friends, interested in learning about whether people they know are directly affected by the nature and severity of events, or simply curious onlookers. Patrick Meier (2010) has referred to crisis maps as not only ‘crowd-sourcing’ but as ‘crowd-feeding’ because information is ‘fed’ back to the crowd. Assuming those directly affected have internet access (no small assumption in a time of crisis) proponents claim that crisis mapping: ‘opens the gates of information to anyone interested, allows citizens in crisis to seek help and helps to foster dialogue between affected communities and services providers’ (Heinzelman and Waters, 2010, 9). A specific audience is the humanitarian community who make active use of the information contained in a map.

In our first example we focus on viewing and then reporting into a map (the left-hand side of Figure 2). The Queensland Flood Map (<http://queenslandfloods.crowdmap.com/>) was developed to inform internet users during the wet Australian summer of 2010/2011 – a screenshot is shown as Figure 3.

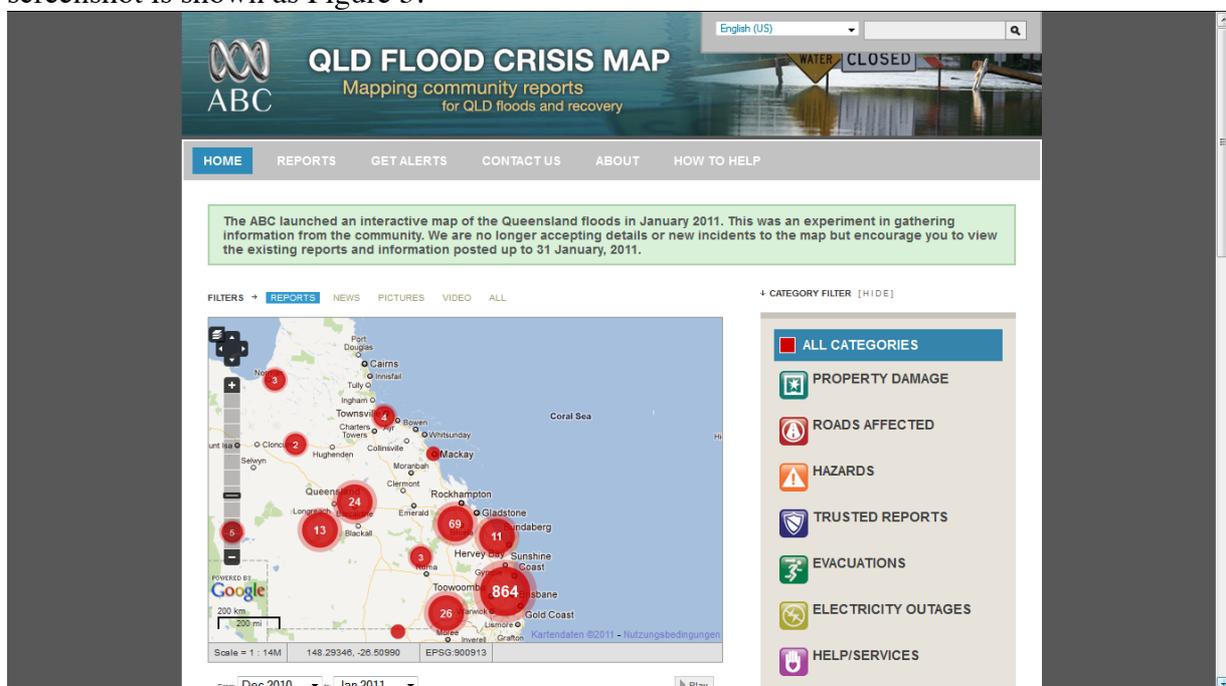


Figure 3. Queensland Flood Crisis Map (Australian Broadcasting Corporation 2010/11)

In its first few hours or days a crisis map may not be very useful to the viewing public. Depending on factors like the amount of traffic to the host site, the profile of the

author, or whether the map is being promoted elsewhere, it may take a while to engage participants and hence for the map to show very much. In this case, however, the 'Queensland Flood Crisis Map' was initiated by the Australian Broadcasting Corporation (ABC), the very organisation that locals turn to for information during emergencies (traditionally through radio, but now too online). The map was thus directly linked to an existing emergency information hub and large media organisation. This meant too that the ABC, as hosts, could begin to populate the map with information from their own news sources. The challenge was, however, to make the switch from 'one-to-many' to 'many-to-many' and integrate information from the public into the map.

To recap, the most basic idea of these maps is that members of the public continually add information to the map to create a database of volunteered, geo-referenced information. Hence, Qld Flood Crisis Map users were invited to take part in an 'experiment' and instructed to:

pass on important information to Queensland residents facing flooding and the task of recovery ... about road closures, flood hazards, property, crop and livestock damage, electricity outages as well as the location and contacts for help centres set up to assist residents in need. We need you to 'submit a report' to make the map as comprehensive and useful as it can be.
(<http://queenslandfloods.crowdmap.com/>)

These instructions spell out the sorts of information viewers can expect in this crisis map – information that viewers will need to provide in order for the map to work. The final sentence of the instructions (above) is thus important, as it encourages the public to contribute. For the map to be interactive, the broadcaster needed to change viewers, particularly viewers in the flooded areas, from passive viewers into active users.

Viewing a map (with active consequences)

The website received 230,000 unique visits in 24 days of 'operation' (Potts, 2011). It is possible to trace some of the ways in which these viewers/users interacted with the map. Most visitors probably just looked at the map, but there is also a gradation in response, with some users demonstrating approval and others engaging practically in catastrophe help as a result of viewing the map. For example, one interactive feature on the map allowed viewers to click to increase or decrease the 'credibility' rating of each report sent in (the equivalent of a 'like'/thumbs up in other social media). Only four percent of reports were interacted with in this way. Another active response is to recommend the website to others. The map was linked to by a mere 16 other sites (according to a Google backlink search) – although the majority of these are web 2.0 or geoweb blogs. There were nevertheless links to the map in other social media, including Twitter and Facebook.

Twitter was used extensively and to great effect during the 2010/11 flood events in Queensland and has been studied as an example of successful use of social media during emergencies (Bruns *et al.*, 2012). The Bruns *et al* report discusses use of the #qldfloods hashtag as a key information node and many tweets with this hashtag contained weblinks passing on relevant information. Forty-eight of the #qldflood tweets linked to the crisis map (only the 38th most popular site linked to through this hashtag) (Bruns 2012, *pers. comm.*). So we can glean the prominence, or rather the lack thereof, of this crisis map in local Twitter chat – though it is also possible that links to the main ABC website drew people to the map. We should be cautious however about under-estimating the uptake of the Queensland Flood Crisis Map site from this small Twitter fingerprint. The burgeoning field of Twitter research,

has so far demonstrated that passive Twitter users far outnumber the active participants (5% of users create 75% of tweets – Sysomos, 2009) Extrapolating these percentages to crisis mapping, we could anticipate that the map was of interest to a much wider viewing public, of which a minority actively participated by referring the site to others, or by contributing reports to the map.

The #Qldfloodmap twitter hashtag was certainly a straightforward way of re-directing existing online announcements into the map. Seventy-six of the 1025 (7%) reports in the map were submitted through Twitter, with tweets usually including the #Qldfloodmap hashtag as one amongst several relevant hashtags. Many of these were re-tweets or contained a weblink, indicating the utility of Twitter for passing on information in crises (Bruns, 2012). One often neglected condition for participation is not only simply the knowledge of the existence of the respective crisis mapping project, but also confidence that the contribution actually makes a difference.

‘Ambient’ reporting

The recycling of social media reporting in crisis maps brings us further along the spectrum of participation. Sometimes information is added to a crisis map without the original author or source being aware that it is being contributed. This sort of information is what Stefanidis and co-authors call ‘ambient’ geospatial information, in contrast to information that has been deliberately ‘volunteered’ into a map (Stefanidis et al, 2011). Because information such as tweets, photos and videos are made public through web-based media they are able to be linked to, cited, re-reported in new contexts such as the Queensland flood crisis map.

Other crisis maps have used ambient geospatial information harvested from trawls of Twitter feeds. Following both the earthquake in Haiti in 2010 and the tsunami in Japan in 2011 map data was generated by those outside each disaster zone analysing twitter streams. While journalists might imagine that their words are cited and used in different contexts, the use of tweeted information or other sources from the ground without the author’s consent raises ethical questions and issues of privacy – especially if the information can be connected to a discrete geolocation. The use of social media blurs the boundaries between what is public and private information. In times of crisis, mappers have assumed an ‘implicit consent’ (Meier, 2012). This assumption is just one dimension of a complicated relationship established through the mapping process between technically savvy helpers (often creating crisis maps from afar) and vulnerable ‘victims’ – one that we take up in further detail in Part 3. For now it is worth noting how crisis maps rely on a datastream of ‘ground truths’ and thus require help (explicit or implicit) from people in the disaster zone to make the map function.

Indeed, the technical changes brought about with geoweb/web 2.0 technology make the fusion of a whole range of data in these maps much more possible. ‘Mapping emergencies’ is the next generation of maps being tested by the Australian Broadcasting Corporation following their trial of the Queensland Flood Map. It integrates RSS feeds and official alerts, and channels a mix of social media (facebook, Twitter, flickr, YouTube) into a map. Some of the other examples we examine further in our paper also use automated data feeds in various forms. Bushfire Connect integrates RSS feeds and geo-locates other digital alerts into a crisis map. The Syria Tracker Map draws on ‘Health Map,’ a data-mining tool that searches for relevant media reports and assigns a geo-location, as a second data stream. This ambient information becomes a dot on the map in the same way as volunteered report do.

Sending reports

So far we have seen how people were able to volunteer information into the Queensland FloodMap through the forwarding tweets to the relevant hashtag (7% of reports). Yet by far the majority of reports were made via the online report form provided as part of the Ushahidi interface. Only two reports were sent into the map as a direct sms and 24 reports (about 2%) were by email (an interesting facet of this was that several people chose email reporting as a means of questioning information contained in the map). The online report form enabled people to enter information in fields for 'time, location and description, as well as assigning one or more of the given categories to the report. People could choose to include name and contact information, but the vast majority of reports were anonymous. The 'crowd' who submit reports is therefore a rather vague community, identifiable only sometimes by the nature of the information they provide. It is difficult to gauge, even in some cases, where they are reporting from. The process of anonymous reporting, leaving out identifying information, helps to promote the idea that participants are 'ordinary voices'. The non-discriminating 'one report, one dot' function of the software replicates the democratic principle of one voice, one vote.

By analysing the content of these reports, we were nonetheless able to differentiate between information pertaining to services or organisations with an official role in disaster management and recovery (such as local councils, water and road authorities and schools) on the one hand, and information provided by individuals reporting on their own circumstances or raising questions, on the other. Around thirty percent of reports could be said to be from individuals rather than from organisations. Looking back at the instructions for participation (above), perhaps the official nature of most of the information listed in the instructions, may have raised the threshold of public participation. Another method for discriminating between reports is the classification of reports as 'verified' or 'unverified'. The attribution of 'verified' is not put in by the person submitting a report, rather by those administering the map. In this case the ABC (as map convenors) verified around 75% of the reports. Many of these contained information about the provision of services from established organisations. The 257 'unverified' messages almost all came from individual rather than institutional participants.

This correlation between crowdsourced information and non-verified reports reflects a more general query about data quality, veracity and relevance in crisis mapping. Supporters of crowdsourced crisis maps maintain that the crowd may provide more accurate data than the expert assessments and follow the premise that some information is better than no information (Liu and Iaucci, 2010; Meier, 2011b). While we do not intend to fully rehearse this debate here, the issue is relevant to the ways in which participants in these mapping projects represent themselves and their data. James Surowiecki's analysis of the 'wisdom of the crowd' (2004), sets out several preconditions for crowd wisdom: diversity of opinion, independence, decentralization and aggregation. From the data available for this crisis map it is difficult to state that all these conditions have been fulfilled. The sample size is relatively small and we do not know if reporters are acting independent of each other or of the existing information contained in the map. Hotspots of activity on the map may represent places most affected by the flood, or places of high internet use (i.e. higher likelihood to contribute to the aggregation of information).

Key in the context of this paper, is that public participation in this map provided information of varying quality and often from unknown sources. The majority of reports were from established organisations and these reports were given a more credible status than those from anonymous crowd sources.

Maintaining a map

The work of verification brings us further along the continuum of participation to the practices of maintaining a map – and to two more examples. Although the above example (Qld Flood Crisis Map) was curated by a large professional media organisation, many crisis maps are maintained by teams of volunteers. The Bushfire Connect map was an ongoing crisis map for mapping bushfires across Australia, from February 2011 to October 2012. The map was maintained by a ‘crowd’ of volunteers from around the country, who ‘activated’ at the beginning of each fire season. Participation was ‘crowdsourced’ in the sense that interested members of the public could offer to work online (as well as offline), contributing whatever skills they had the job of maintaining and curating the dynamic map. We consider the term ‘cloud collaborators’, following Mark Graham (2011a, 77) may be more appropriate than ‘crowd sourcing’ for this kind of interaction, as the participants come together to collaborate online, in the ‘cloud’.

Small scale, with 14 people moderating and a handful of others coordinating, the Bushfire Connect project was run in a similar manner to a local voluntary organisation. Martin Tomko, one of the volunteers, considered that while it may be useful having people in different time zones (and well away from danger in a crisis), participation relies on local (geographic) knowledge (Tomko, 2012, pers.comm). The small team of moderators worked to a roster during the fire season, ready to verify and check data in the reports. The majority of reports (Tomko estimates 70%) were from official emergency management organisations, through RSS feeds and email alerts. Bushfire Connect saw their role as a bridge between the community and these agencies, providing the public the opportunity to feed information back (Tomko, 2012 pers.com). Yet the map was also in competition with the original feeds for its audience – a situation that ultimately affected the success and longterm viability of Bushfire Connect. The sustainability of the project thus depended not only on sustainability of the team of volunteers, but the relationship of these volunteers to existing emergency management organisations and how seriously the Bushfire Connect map was taken by the participating/viewing public.

The need to establish links with existing disaster management organisations and ‘on ground’ responders has also been recognised by another, larger group of cloud-collaborating cartographers too: the, broadly named, ‘Standby Taskforce’. This is a community of online volunteers that grew out of the International Network of Crisis Mappers – an online network of mapping practitioners and researchers. The Standby Taskforce is a much larger group of volunteers than Bushfire Connect and they come together in different configurations from crisis to crisis. In this section we will look at the way people participate through the Standby Taskforce, and the group’s involvement in maps of Syria and Libya as further examples of crisis map curation.

Since its inception in 2010, the Standby Taskforce has been involved in several ‘deployments’, developed internal structures and has increasingly formalised interactions with governmental institutions, non-government organisations and private companies in the geospatial and emergency management domains. These include collaborations with the United Nations Office for Coordination of Humanitarian Affairs, US AID and Amnesty International. The Taskforce has also joined a ‘network of networks’ called ‘Digital Humanitarians’ (<http://digitalhumanitarians.com>) that offers a range of mapping, (social) media monitoring and analysis services during a crisis. There may well be a tension between retaining autonomy and fluidity and establishing the structures necessary to provide a service in a time of crisis.

Membership of the Standby Taskforce is 'by invitation only' or interested outsiders can go through an approvals process. As part of this process, would-be Standby Taskforce members sign a code of conduct agreement, with eleven key principles: Humanity, Neutrality, Impartiality, Respect and Empowerment, Safety, Lawfulness, Professionalism, Responsibility, Good Fellowship, Loyalty, and Integrity (StandbyTaskforce, 2011). Particularly in the case of mapping conflicts it is easy to find ways in which principles such as neutrality and impartiality are problematic. For example, a crisis mapping of the violence in Syria since March 2011, the 'Syria Tracker' (syriatracker.crowdmap.com) suggests that reports can be sent into the map by tweeting with the '#basharcrimes' hashtag, indicating a political position at the outset (the Taskforce did not set up this map, but have helped in an official capacity with the verification of reports).

As a policy, the Standby Taskforce does not create a deployment for a crisis until it is invited to do so. Taskforce members respond to requests from humanitarian organisations and extend offers to help local or smaller initiatives establishing maps (often through the Ushahidi platform Crowdmap) during or leading up to a crisis. In the case of Syria, there have been a number of crisis maps dedicated to violence there in 2011 and 2012, made with Crowdmap as well as other platforms (e.g.: syriatracker.crowdmap.com; behindthewallsyria.crowdmap.com; syriaspring.crowdmap.com; syriamarch15.com/; syriamap.wordpress.com/). The Standby Taskforce has helped with Syria Tracker, as well as working with Amnesty International-USA to scan satellite images for visual evidence of mass gatherings, troop and tank movements, and damaged buildings (<http://www.eyesonsyria.org/>; <http://www.fastcompany.com/1781570/how-amnesty-international-crowdsources-the-syrian-crisis>). Choosing to work with particular mapping projects, even those with humanitarian organisations, means the principles of neutrality and impartiality in particular can be called into question.

Working across wide distances and time zones, the Standby Taskforce uses the 'cloud' as a space to come together using collaborative software platforms to coordinate their work. The Taskforce is divided into teams with different functions and skills in the map curation and presentation process— such as an ability to work with geographic information, programming, media monitoring, and statistical analysis. The diagram below (Figure 4) shows how the teams worked together to curate information about the civil war in Libya in 2011.

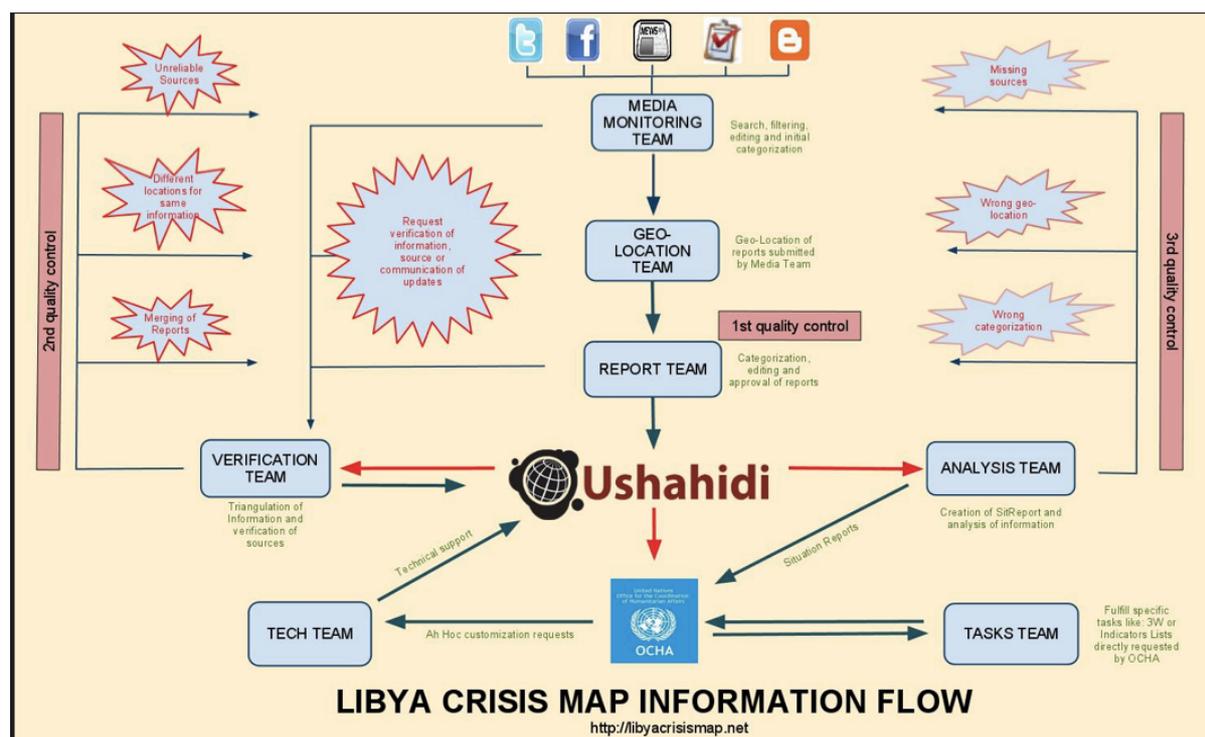


Figure 4. Standby Taskforce teams and workflow (Iacucci, 2011)

The flow from top to bottom shows how the different teams sourced reports, checked location and tried to verify the content. They also classified information according to the different categories established in the map and analysed data for UN-OCHA in their humanitarian co-ordination work.

Due to the nature of the conflict, the Libya Crisis Map was a test bed for several techniques used to protect informants and verify reports. The use of what Meier (2009) has called 'bounded crowdsourcing' through a team of trusted informants was a central element. The Taskforce also worked to establish methods of 'triangulation' of information (Meier 2011b), cross-referencing information from different sources. Protection of those providing reports has been a concern in compiling the Libya and Syria maps and members of the Taskforce have explored methods for ensuring that those contributing are not traceable. Furthermore those wishing to assist the Standby Taskforce with the mapping effort were asked to pass the 'I'm-Not-Gaddafi Test', to demonstrate they were trustworthy (described in Meier 2011a). Turning briefly to this form of checking, we see those with 'academic' or 'professional' identities being seen as trustworthy; and those with Twitter, Facebook or linkedin accounts or websites as able to be authenticated because the assessment team could scan posts/tweets for suspect political positions. Reflecting back to the original claim to represent 'ordinary voices', it is worth considering how the criteria for selecting those who curate information has the potential to exclude particular participants and thus filter the data included in the map.

At least these formal processes provide some guidance about who is curating the data in a map and transparency around who set it up. Other maps simply appear without metadata about authorship. In the next section we discuss participation in setting up a map. Beginning, however, with a map where metadata about authorship is missing, a mysterious alternative crisis mapping of Syria: the *syriamarch15* map (<http://www.syriamarch15.com/>).

Setting up a map

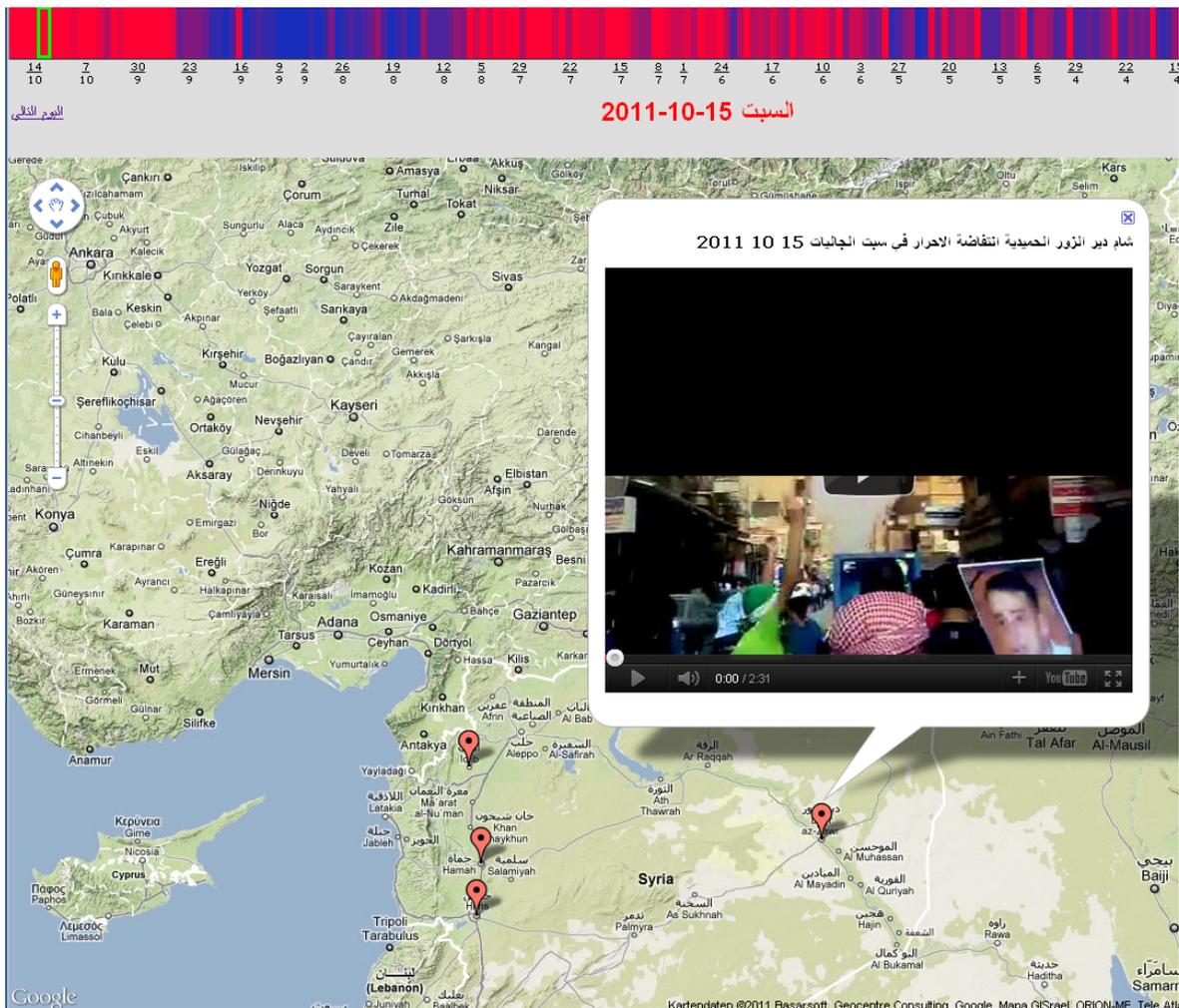


Figure 5. Syriamarch15.com map (Anonymous, 2011/12)

As depicted in the screenshot (Figure 5), Syriamarch15 was a crisis map that visualised video clips of demonstrations and violence in Syria from March 2011 until February 2012. It was a simple but effective mash-up, placing links to YouTube videos on a Google map of Syria. A timeline running along the top of the map enabled the viewer to examine videos for any given day. The timeline was represented by bars, colour-coded in a blue-red scale depending on the number of reports for that day (shown as the upper banner in Figure 5). The website provided no information about the creators of the map or the contributors of the videos. Clicking on a given day would often show links to videos posted in different cities for the same day, suggesting reports were being aggregated from several sources. The website disappeared in late February 2011, first showing a data overload error and then a Google error. At the time of writing (April 2012), entering the url brings up a site where the domain name can be purchased.

This aggregation of information – the daily work of one or a group of activists over almost a year – came and went, demonstrating how ephemeral information on the internet can be. It is also hard to trace the identity of the participants - a search for the host server, for example, revealed the site was a ‘blogger’ site, on a server in San Francisco hosting blogs from around the world. The tools that were used to make the map are available to all those with an internet connection and free access to YouTube and the Google API. We do not know if the maker(s) knew the creators of the videos or simply picked out YouTube videos

on the demonstrations as they emerged. As the website has now gone we have not been able to go through each video to determine whether they represent some sorts of protests and not others or indeed to investigate provenance. The map did not sort information other than by time and location, the most subjective aspect being the colour-coded bars that denoted the degree of activity on any given day. Only the map stands as something to be interpreted (as we will in the next section) and for now we can only speculate on the intentions of its creator(s).

One justification for creating maps like these is to put information on the public record. The discourse of the map – with an inherent rhetorical power of saying ‘this is there’ (Wood, 2010, 58ff.) – helps to lend credibility to the evidence (particularly given that videos about all sorts of weird and wonderful things are posted on YouTube). Giridharadas (2010) notes that: ‘Ushahidi is quietly transforming the notion of bearing witness in tragedy with ‘aggregate, average, good-enough truths’. The accumulation and mapping of data as evidence of wrong-doing and the tactic of making this publicly available has been a key element of conflict related crisis maps – notably Amnesty International’s ‘Eyes on Dafur’ and ‘Eyes on Syria’ projects, as well as Invisible Children’s LRA map. Catherine Summerhayes reflects on the embodied nature of interacting with the Eyes on Dafur map and the political implications of making these reports public in the map. Drawing on the work of Judith Butler, Summerhayes (2011, 134) talks about the power of open grieving, how this can elicit feelings of outrage and a ‘responsive performance of compassion’.

According to Liu and Palen’s useful qualitative study of these ‘new cartographers’, ‘persuasion and mobilization of audience’ is one justification given by those who create crisis mapping projects (Liu and Palen, 2010). Their survey of nine crisis map instigators revealed a series of justifications why people create and participate in the production of crisis map mash-ups, including: personal interest and gain; curiosity about information display potential, expediting communication of information, making information more accessible and useable (and persuasion and mobilization of audience). Those who create public crisis map (mash-ups) are, according to Zook and Graham et al (2010, 11) participating in an online ‘gift economy’, ‘gaining cultural capital by helping other people’.

Creating a crisis map requires some technical competence (as well as access to computers and network services) but with software specifically designed for crisis mapping, such as Ushahidi, and the online support of networks like the Standby Taskforce even those with little prior experience can set up a map. Crisis mapper Tim McNamara claims that these ‘extremely low barriers to entry [mean that] many new entrants are appearing in the fields of emergency and disaster response ... ignoring the traditional hierarchies, because the new entrants perceive that there is something that they can do which benefits others’ (cited in Meier 2012, April 9). He further claims that: “Crisis mapping is not simply a technological shift, it is also a process of rapid decentralization of power.” This claim harks back to the rhetoric we examined in Section 1 and asks us to draw conclusions from our analysis of participatory practices – such as who is (and isn’t) being empowered through processes such as anonymous reporting, or ambient re-reporting of tweets for help, or the potential exclusion of those without existing social media profiles from curating map information. Questions of empowerment, exclusion and inclusions are also relevant to us in the third and final section of our paper, as we ask how this ‘decentralization of power’ is achieved in or through the interface of a map.

²A public plea, therefore, in the interests of ongoing research: the authors invite contact from those who know more about this map and the process of its creation.

Part 3. The Crowds in the Map

As we discussed in the previous section, participation in crisis mapping can vary along a continuum of participation stretching from passive viewing to setting up a map. In this section we turn to technological and semiotic properties of the actual maps, considering how participation is being visualised through the design of crisis maps, determining how the ‘ordinary voices’ of the crowd might speak through a map. In particular we critique the handling of locational, temporal and classificatory aspects of the data and the visual message presented in crisis maps. If maps can be read, following Wood, as ‘propositions’ (Wood, 2010), how can these maps, as the synthesised collection of many voices be interpreted?

The basic anatomy of a crisis map is a base map with a crisis information overlay (see Figures 1, 3 and 7). Through the Ushahidi platform those setting up a map may choose for example an OpenStreetMap or Google map or satellite imagery as base layer. Most maps have a straightforward process where every report becomes one dot on the map showing where the reported event occurred (some have the provision for a report to be represented by a line or polygon, although these geometries are hardly ever used). The volume of data that has been contributed, what can be broadly recognised as the product of participation in a map, is then immediately visible. Within the Ushahidi program, when there are many reports at one location (usually when the map is zoomed out) these reports are compiled together into larger blobs with a numerical total. The default colour being red, basic Ushahidi crisis zones are represented by blobs of red that cover the underlying landscape. For a contributor to a standard Ushahidi crisis map, assigning the correct location for an event can pose difficulties as generally only one location per report is entered. Hence data relevant to a number of sites has to be entered multiple times, or one site has to be chosen. One report was added to the Syria Tracker map containing an analysis of all map data so far (a ‘meta-report’, if you like). Just like other reports to the map it was assigned a location and thus a spot in the centre of Syria was chosen – the information related however not to this location but rather the whole of the country (and even beyond Syria’s borders). In this case, by representing each report in the same way the nature of the data actually becomes more confused. Morrow *et al* note that the inability to pinpoint a geolocation meant that less than 4000 of the 15,000-60,000 reports collected in response to the Haiti earthquake were entered into the crisis map (Morrow 2011, 22). The principal of one report one dot (while egalitarian and may help to normalise information within the map) does not always help to convey information correctly (and in the Syria map actually hides the important analytic work done).

In addition to problems with representing locational information, temporal data also poses challenges. The SyriaMarch15 map only ever showed the reports from a single day at a time, but by navigating through the coloured bars at the top of the map, the viewer could move through time (seeing a daily snapshot at each point). Most Ushahidi crisis maps however show all the reports that have accumulated over time. Syria Tracker for example has accumulated reports/dots since April 1, 2011. The viewer can select different time periods to view a subset of reports, but the default is to see all the reports. Some maps, like the Bushfire Connect map, accumulate data over several years or seasons (with out of date data potentially confusing new viewers). While Roche et al (2011) suggest the usefulness of crisis mapping is limited to response and recovery phase, we consider that these cumulative datasets may also be important in disaster preparedness and other planning contexts.

For data to be useful though, it matters how it is sorted and presented. Apart from sorting reports temporally, crisis map data is often also sorted by category so that different types of information can be viewed independently. The Ushahidi default setting is to see ‘all categories’ which in the Syria Tracker map (shown in Figure 6) mixes up all sorts of

information, including reports of people killed or missing, with the general categories of ‘announcement’, ‘article’ and ‘Twitter report’.

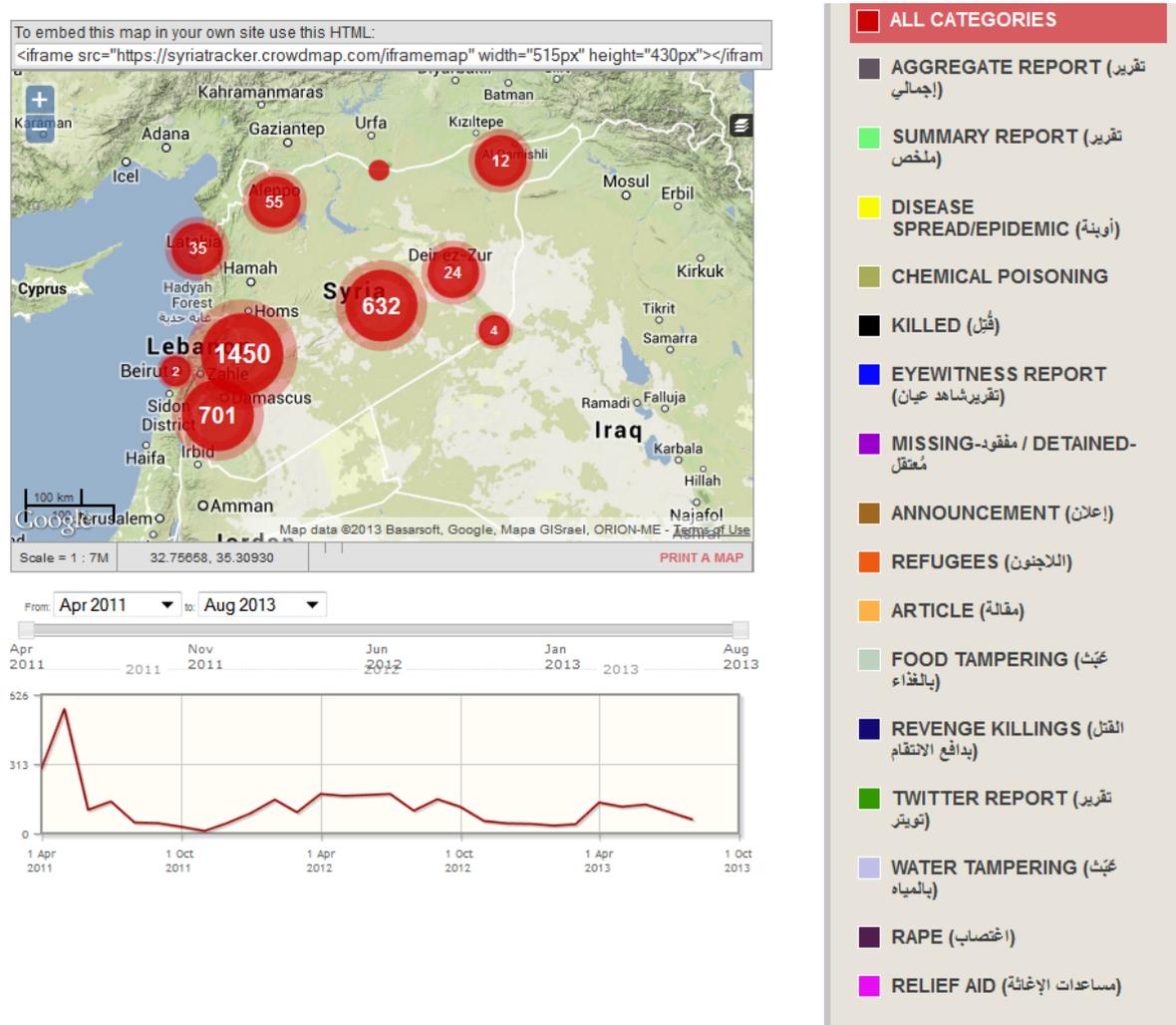


Figure 6. SyriaTracker (screenshot from August 2013)

Furthermore it includes the category ‘aggregate report’ which may lead to some double counting. Given that these categories are often set at the outset of a crisis, when it may not be obvious what types of information will be most relevant, the likelihood that some categories (in this case, ‘water tampering’ and ‘food tampering’) are seldom used. Syria Tracker contains several overlapping or incomparable categories on different levels of aggregation, scales and data-types. The structuring of information according to inconsistent classification systems is a common problem in Ushahidi crisis maps. Morrow et al. (2011, 22) note that classification did not add much value to the Ushahidi Haiti Map.

The logic of Ushahidi to map data indiscriminately in spite of great spatial, temporal and classificatory inconsistencies follows a rationality of compiling as much data as possible. Several authors state that accumulation of single reports and their spatial distribution reveals key information for crisis response. For example, in their report for the United States Institute for Peace, Heinzelman and Waters state that: ‘through the aggregation of individual reports, the crisis mappers were able to identify clusters of incidents and urgent needs, helping responders target their response efforts’ (Heinzelman and Waters, 2010, 7). A similar point was made in an article in the New York Times: ‘as data collects, crisis maps can reveal

underlying patterns of reality' (Giridharadas, 2010). The mapping interface seemingly provides a way of ordering chaotic information.

With the ability to zoom out and look over a crisis area (the equivalent of Haraway's God –Trick (1988)) the map viewer can take in the extent and density of the crisis (insofar as the dots on the map can be read as equivalent to sites of the crisis). The map interface helps the viewer relate to the data, by ordering it spatially, offering a way of determining possibilities for how the crisis might be managed. There are parallels here to Goss's observation of what GIS technology enables:

GIS 'creates the space of the administrative sciences which postulate a reality that is objectively observable, measurable, 'mappable' and ultimately predictable ... It is simultaneously an enactment of power-knowledge over social space'. (Goss 1995, 182 cited in Turnbull 1997, 560)

A 'crisis area' covered by big red dots produces a particular essentialist view from nowhere, often reproducing problematic geographical imaginations. The lack of temporal, locational and classificatory precision in the data tends to distort, exaggerate and relativize the 'big picture' of a crisis. Such diverse information as announcements by politicians, calls for help on the ground, summary reports or spread of diseases are all equally mapped as single dots, temporally and spatially fixed. The manifold forms of participation behind these maps are blurred through the mapping practices and limits of the technology.

Conclusions

Critical discussion of these maps is important not only to debunk the idea that these are clean representations of 'ordinary voices', but also to inform those using these maps about what they are interpreting. Awareness about how crisis maps may be inclusive and exclusive and how particular sorts of participants may be privileged within these spaces is also important here. Graham's (2011b) notion of manifold digital divides is helpful in this regard. He distinguishes between "[...] physical divides separating people from access to cyberspace, and the cyber-divides that obstruct movement between cyberspaces" (Graham, 2011b, 220). Even people with fast and stable internet access may be excluded through forms of censorship, language barriers or page ranking algorithms. If we consider such exclusion mechanisms in the often chaotic circumstances of humanitarian crises, the potential participants of crisis maps can shrink to a privileged minority.

Furthermore, the current emphasis on participants as a 'source' of information has meant participation within the map and interactive use of the map tends to be forgotten. Muki Haklay warns that web 2.0 mapping has seen a disregard for the complexities of professional spatial analysis and cartography, and reminds us also that attention need to be paid to how different cultures/ different sorts of users interact with these programs (Haklay, 2010, 135). In particular, given the dynamic nature of crisis situations we might imagine (following the 'many to many' rhetoric described in section 1) how communication could continue within the mapping interface. Really these maps are interactive only insofar as many participants can enter data. Although crisis maps have been described as 'a disaster wiki', as "bringing the Wikipedia revolution to the work of humanitarians and soldiers" (Giridharadas, 2010), or "just like with Wikipedia[...]available for all to scrutinise and to edit" (Mc Dougall, 2011,21), the format of these maps however does not readily permit the editing or questioning of information already submitted to the map. Reports are accumulated, but most maps do not provide a facility for 'wiki' type interaction.

Some Ushahidi maps have comment fields and credibility points within the reports but these are rarely used and do not affect how the reports are visualised on the ‘crisis map’. Despite comments saying an event is over or alert is off, reports are not removed. Instead we might think about how these maps could be sites of interactive exchange. A website is an extension of the public space and as ‘architects’ of the maps, those setting up crisis maps could consider the sorts of interactive spaces they create. We might consider the kinds of innovations that foster interaction: perhaps these dots could move to reflect active debate of the information in a report. Three dimensional and animated mapping offer many possibilities for depicting data that changes (temporally, spatially, and in terms of validity or level of agreement) through the course of a mapping deployment. Again, awareness about how spaces may be inclusive and exclusive and how particular sorts of participants may be privileged within these spaces is important here.

As our analysis in this section has shown, the Ushahidi technology follows a database-driven logic to compile as much data as possible at the expense of much spatial, temporal and classificatory accuracy of the information. This rationality weakens the usability of the maps and blurs the participatory potential of crisis maps by turning much information into noise. Further, the concept of participation fostered through crisis maps is mostly limited to data collection. The possibilities to discuss or edit this data in a wiki-style are marginal at best. These findings pose some questions about how crisis maps can be used beyond just contributing information and adding data. Further research has to look more closely at the impact of these maps in terms of both, representations of ‘crises’ and strategies for coping with them.

This article takes the involvement of the crowd as a starting point for a wider consideration of the promises and products of crisis mapping. By beginning our analysis with a discussion of the rhetoric around crisis maps we have shown how they appeal to notions of participation and bring with them particular aspirations, such as seeking to bring ‘ordinary voices’ into the ‘operating room’ of crisis management. Drawing upon an explorative sample of crisis maps, we took a closer look at the different forms of participatory practice, from lurkers to map designers. We revealed various modes of participation and also showed ways in which the identity and actions of participants are obscured. These maps gain currency from the idea that they represent the active volunteering of information, so it is important also to note the quantity of data in most of these maps that has *not* been ‘volunteered’ – either coming from media reports, official sources or has been harvested as ‘ambient’ information. Finally, by examining the maps, as the products of and (importantly) the public space of participatory practices, we have noted the limits of interaction currently possible within online crisis map interfaces and furthermore have suggested attention be paid to the visual messages these maps impart, within the immediate arena of crisis management but also the implications for how crises are conceptualised by the wider community.

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