

Confronting the hype: The use of crisis mapping for community development

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Abstract

Crisis mapping has emerged as a method of connecting and empowering citizens during emergencies. This article explores the hyperbole behind crisis mapping as it extends into more long-term or 'chronic' community development practices. We critically examined developer issues and participant (i.e. community organization) usage within the context of local communities. We repurposed the predominant crisis mapping platform Crowdfunder for three cases of community development in Canadian anglophone and francophone. Our case studies show mixed results about the actual cost of deployment, the results of disintermediation, and local context with the mapping application. Lastly, we discuss the relationship of hype, temporality, and community development as expressed in our cases.

Keywords

Community development, community informatics, crisis mapping, ICTs, mashups, mobile technology, social media, Web 2.0

Introduction

Crisis mapping has garnered considerable media attention, volunteer support, and funding from numerous institutions (Forrest, 2010; Gao et al., 2011; Greengard, 2011; Morrow et al., 2011;

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Roche et al., 2013; Zook et al., 2010). According to Meier (2012a, 2012b), crisis mapping technologies will save the world ‘one map at a time’, and they have high levels of interactivity and are considered relatively effortless (compared to traditional geographic information systems (GIS)) to build. Crisis mapping software platforms promise to eliminate the need for GIS professionals in mapping emergencies. The platforms also accrue a seductive power because they allow for the rapid collection of reports on the ground and therefore exude an immediacy of responsiveness that matches the urgency of a crisis. As well as a set of technologies, crisis mapping is promoted as a medium by which individuals can easily contribute and share information where this information is otherwise impossible to acquire, and those impacted by the crises can potentially counter the power dynamics of the state (Meier, 2011; Searle and Wynn-Pope, 2011). Distant volunteers can be marshalled to crowdsource the maps of entire post-disaster road infrastructures and refugee sites. As a platform and medium, crisis mapping has become so popular, the United Nations eschewed their traditional mapping methods to use crisis mapping for several humanitarian emergencies (Gao et al., 2011; Roche et al., 2013; Zook et al., 2010).

A part of the evangelism (Norheim-Hagton and Meier, 2010) is the repurposability of crisis mapping technologies to various other urgent issues. We attach the word crisis to many things: housing crisis, crisis of poverty, border crisis, and subprime mortgage crisis. Crisis mapping authors specifically mention community development as an area, where practitioners can leverage time and cost efficiencies, tap into a larger pool of talent, activate more participants, and create greater ownership of the process. Community development is a long-term geographically embedded process where community members collaborate by means of an organized intervention with the goal of empowering community members vis-à-vis the circumstances that affect their lives (Lyndon et al., 2011). Because community development emphasizes bottom-up engagement by nonexperts, crisis mapping and community development appear made for each other.

This article explores the hype about crisis mapping via its extension into community development practices – that is, communities in crisis. We examine one-half of the crisis mapping community – those who build and use applications for on-the-ground reporting as opposed to those who largely digitize satellite and other imagery to assist in disaster recovery and humanitarian relief (cf. www.crisismappers.net). We utilized, or rather repurposed, Crowdfmap for three community development initiatives in English and Francophone Canada. Crowdfmap is the cloud-based version of Ushahidi, the software of the eponymous nonprofit software company that developed the first platform specifically for crisis mapping. Crowdfmap allows contributors to send messages via short message service (SMS or text messages), e-mail, Twitter, Web reports, as well as a smartphone application, to a Web site hosted by Ushahidi, Inc. that visualizes the messages collected on an interactive map. We engaged in participant observation, that is, we codesigned the applications and we critically examined their utility in community development. We were driven by the question what happens to the hype in practice?

Literature and history of crisis mapping

Crisis mapping traces its origins to mapping and spatial analysis for humanitarian relief during crises. Relief agencies such as the United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA) were searching for more efficient and effective information and communications technologies (ICTs) to assist in delivering emergency services. Agencies have long turned to GIS and remote sensing, for example, to map concentrations of victims, to inventory damaged roads, to calculate shortest paths to those affected by a natural or human-induced disaster, and to

visually convey the crises on the ground (Kaiser et al., 2003; Poblet, 2013). The challenge in GIS was the steep learning curve in using these technologies, the reliance on top-down processes and experts, their consequent slowness in responding to emergencies as well as the disconnect of these remote experts to on-site activities.

What gives crisis mapping its rhetorical power lies in its coupling of emergent easier-to-use mapping technologies with nonexperts (i.e. individuals not credentialed in humanitarian relief or in GIS). The earliest example of crisis mapping originated as a bottom-up, endogenous call in Kenya to allow for easy and fast reporting of postelection violence in 2008 (Goolsby, 2010; Meier, 2012c). Okolloh, a Kenyan activist, voiced a disconnect between local media coverage and direct information received from local sources (Okolloh, 2008). The situation on the ground was dangerous, which rendered local reporting difficult. An African software developer responded to the call and created the mapping–texting platform Ushahidi. His aim was to address the need for the people on the ground to gain access to free mapping technology that allowed individuals to communicate with one another and with those seeking to help victims (Okolloh, 2008). The resultant platform accepted reports and mapped them. The map was presented as a success where people on the ground were empowered to portray a more accurate picture of the postelection violence in Kenya (Makinen and Kuira, 2008).

Although Ushahidi was launched in Kenya, its best known usage occurred during the 2010 Haiti earthquake (Forrest, 2010; Roche et al., 2013). Here volunteers and paid staff of the newly formed Ushahidi, Inc. collaborated with a Haitian diasporic community to build an application using the Ushahidi platform in just a few days (Meier, 2010). These individuals also administered the application during the recovery efforts. Individuals who were on the ground reported to a short code created for the crisis. Some 40,000 to 60,000 text messages were received and 3584 events were mapped in Haiti (Morrow et al., 2011). With the speed of application development, engaged volunteers, and the sheer number of reports, crisis mapping was proclaimed as a transformative and revolutionary movement (Meier, 2012c). Researchers Arney et al. (2014) reported that in a remote village in Haiti, ‘[t]here were three women who were severely injured . . . had it not been for us using open source information that was available, we wouldn’t have been out there and I don’t think they would’ve survived’. Crisis mapping was said to save lives.

The rhetoric served to attract even more volunteers. Originally, Ushahidi, Inc. used Google Maps as their base map – the map onto which the reports were geocoded – but switched to OpenStreetMap (OSM) because Ushahidi, Inc. felt the latter provided quicker updates than the former. OSM began in 2004, as a collaborative all-volunteer mapping effort with the goal of building an open and free map of the world. OSM invites volunteers to digitally contribute geographic content like streets onto the OSM platform, and some of these volunteers became interested in applying what is called base geographic data contributions (i.e. roads, building footprints, vegetation, and points of interest) to crisis mapping. In the case of Haiti, OSM formed the Humanitarian OpenStreetMap Team (HOTOSM), which gathered 600 volunteers from the OSM community to ‘populate’ Port-au-Prince on OSM. OSM was credited with building the most comprehensive map of the city’s downtown area post-earthquake (Meier, 2012a; Soden and Palen, 2014). As reported in Soden and Palen (2014), agencies like UN OCHA and UNICEF began abandoning their traditional GIS to rely on OSM for emergency relief in the aftermath of the Haiti earthquake.

Proponents argued that, as more people around the world discover the power of crisis maps, they could easily extend from acute events to long-term use cases (Marcus, 2011; Shanley et al., 2013; Ziemke, 2012) like poverty, homelessness, gender-based violence, foreclosures, and forced

eviction. For example, the Ushahidi platform was repurposed to build HarassMap in 2005, which allows people to report incidents of sexual harassment in Egypt (Hairsine, 2014). HOTOSM's reaction to a series of Indonesian crises was to respond proactively, as Indonesia was identified by HOTOSM as a country chronically prone to disasters (Chapman, 2014; Soden and Palen, 2014). The volunteers would build the underlying data infrastructure of roads and buildings before being prompted to do so by a specific disaster. There have been a few applications of Crowdmap for community development (e.g. Living Local in Chequamegon Bay, <https://sustainablechequamegon.crowdmap.com/>; Community Kitchens, <https://communitykitchens.crowdmap.com/>; and Living the Dream, <https://rainierbeach.crowdmap.com/reports>). According to the sites, projects were implemented to map social justice issues, highlight community building, improve public policies, capture community assets, and support and promote nonprofit organizations within the community. There is no reporting on the viability of these projects and they are essentially dead sites. For example, message contributions to Living the Dream app ended in 2012 and only two more were added in 2014. The goal of our research is to evaluate this repurposing.

Early on, those directly involved in crisis mapping remained somewhat critical of these ICTs, identifying challenges of unequal access to technologies and breaches of data privacy (Bailard et al., 2012; Meier and Leaning, 2009; Morrow et al., 2011). Okolloh (2009) admitted that the citizen reporting revealed an ad hoc approval process with accompanying mistrust of users' contributions. This differs from on-the-ground humanitarian response teams 'with often rigid information requirements, which typically require certain types of information at certain times and organized around certain response sectors and geographies' (Morrow et al., 2011: 5). Inequities in user involvement exist (Morrow et al., 2011; Okolloh, 2009), often with no standards for technological platform training for volunteer developers and administrators (Morrow et al., 2011). This was corroborated by Goodchild and Glennon (2010) who found that volunteered geographic information, because of its questionable quality, may hinder rather than help a disaster situation. For example, locations referenced in the crisis messages have often been found to be inaccurate (Gao et al., 2011; Morrow et al., 2011). In the Ushahidi Haiti example, overall data quality was sacrificed in face of the hundreds of thousands of reports received, frequently in the form of e-mails. Meier (in Arney et al., 2014) noted that 'it was impossible to catch up and [we] were always behind which in many ways felt like a failure . . . how many thousands of emails did we not go through that could have contained really important information'. Agency officials recommended greater understanding between remote volunteer communities and humanitarian personnel of goal, expectations, and work tactics management to better coordinate volunteers (Searle and Wynn-Pope, 2011: 3). Meier (2010) reserved his harshest criticism not of the aid agencies but of the academics, whom he accused of being 'smart talkers' who lacked constructive criticism/feedback and 'obsessively' emphasized the pitfalls of crisis mapping deployments.

Remoteness is a key part of the evangelism but emerged as a key conflict. The evangelism is exemplified by MacKinnon of CrisisMappers, UK (quoted in Arney et al., 2014):

With few exceptions, these individuals work remotely from the crisis in question. There is no job in the world that could pay for the way this makes you feel when you actually know you have saved someone's life from sitting in your sitting room, in your pajamas at 2 o'clock in the morning. It's priceless.

Although volunteers need not be on-site to contribute, both Ushahidi, Inc. and HOTOSM have increasingly recognized the importance of local knowledge and local context. In large part, this is because engagement of local individuals and organizations, it is assumed, will assure the technical

sustainability of specific mapping efforts (Soden and Palen, 2014). Ushahidi endorses participation of local organizations because locals know the context and, it is hoped, will eventually assume the responsibility of maintaining the crisis mapping application (Antonsson, personal communication with the first author, July 15, 2014). Nonetheless authors evoke a tension between local and remote actors in terms of who is responsible for what.

The relationship between local and remote plays into the proclamations that crisis mapping offers a vehicle for empowerment (Arney et al., 2014; Meier, 2012c, 2013). Sheller (2013) described one way in which the Haiti earthquake empowered local Haitians who had felt excluded from traditional GIS production because locals gained access to identical up-to-date aerial imagery as the relief workers and engineers. Turner (2006) calls this ability to marshal the tools normally reserved for the powerful neogeography as follows: 'do-it-yourself' mapping from the ground up, without the need for experts, government intervention, or professionalization. There is no need for a GIS technician to collect data, arrange that data into databases, and select visualization options. Exhortations of empowerment from what is termed participatory mapping or participatory GIS are well known (cf. literature reviews of Dunn, 2007; Sieber, 2006). The literature describes both the hype surrounding digital mapping projects as well as some empirical evidence of empowerment that projects purport to give voice to the unheard, upskill the marginalized (e.g. cartographic and technical skills), provide the same tools as the experts have to spatially visualize and analyze phenomena, enable the have-nots to influence policy and exert positive change in people's lives. That same literature remains skeptical about claims of empowerment: empowerment can coexist with marginalization (e.g. the technically skilled in an organization become more empowered than the technical have-nots), remote neogeographers may fail to accept long-term responsibility for the effects of the mapping technologies, projects can create the illusion that mapping accomplishes societal change requiring no structural changes, and it can be challenging to track long-term empowerment (Dunn, 2007; Leszczynski, 2014; Sieber, 2006). The latter explains why application development tends to be studied instead of extended ICT use. Even Sheller (2013: 198) admitted that, despite other assertions of empowerment in post-disaster Haiti, extensive participation in the actual mapping did not appear to be occurring and analysis was still being conducted by experts, albeit local experts.

Researchers of 'digital humanitarianism' have expressed concerns that crisis mapping is grounded in a kind of knowledge politics, which assign legitimacy, authority, and credibility to certain members and not others (Burns, 2014a). Actors in crisis mapping bring differing perspectives to crises, producing clashes over priorities and goals, conflicts that fail to be resolved (Searle and Wynn-Pope, 2011). Burns (2014a) argues that this clash results in a state of epistemic closure, around which data are included and therefore considered valid, around what constitutes an acceptable category, and how one accords data accuracy. Inclusion speaks to the way HOTOSM projects consider geographic areas without accounting for on-the-ground knowledge (e.g. participant collective memories of hazard zones) because this local knowledge is not directly visible on or translatable to a map. Despite calls for empowerment, administrators have an outsized role in selecting and then categorizing messages, which match what they decide are urgent. An emphasis on accuracy (e.g. in location) can potentially sideline non-Cartesian knowledge practices (e.g. prevalent in indigenous mapping) because mapping platforms do not reflect local mapping practices. Thus neogeography and Web mapping can further a 'framing device of professional elites that define what enters the public discourse about the impact of the Web on society' (Scholz, 2008). While researchers are sympathetic to crisis mapping, they caution that a knowledge politic can support that of the technically savvy, whether expert or enthusiastic volunteer, over the affected community.

Methodology

Our research investigates the repurposing of crisis mapping for community development. We worked with three community organizations in Canada. Table 1 shows the characteristics of the case studies. We varied cases by class and language. Vancouver (i) and (ii) were activist driven, whereas the Montreal case was managed by part-time professional community organizers. The Vancouver cases had issues resembling crises, for example, immediate rezoning, anti-densification, and loss of social housing. The Montreal organizers wished to address longer term issues like the recording of community assets. All were excited at the prospect of a mapping app that integrated citizen reports. For instance, Vancouver(i) desired the quick reporting aspect. Montreal was attracted to the potential of a texting app they hoped would attract youth to community development.

After identifying interested communities, methods included development of explanatory material, codesign of applications, recruitment of contributors, and participant observation during application development and deployment. We prepared for the meetings with community organizers by creating storyboards (i.e. comic books) to explain the process of mapping. Manuals were created for application management, including submission reports (texts, tweets, Web reports, e-mails, and smartphone messages), geolocation of reports, and handling of messages that contain personal identifiers or foul language. Applications were developed iteratively with extensive community consultations and were launched after consensus about site content.

Each application contained three components: a mapping software platform, telecommunications hardware, and a telecommunications software platform. We used the Crowdmap platform to develop the applications. We registered each mapping application under a unique URL, chose the base map (e.g. Google Maps or OSM) and the layout theme, and we created an e-mail account and added a Twitter hashtag. We then tested different methods to submit messages (i.e. e-mail, Web, Ushahidi smartphone application, and tweets that include the chosen hashtag). We enabled SMS because most crisis mapping contributions in the developing world are sent via SMS and because, in Canada, text messages via 'dumb' phones are more common than smartphones, a legacy of very high data rates in Canada. Specific mobile networks were matched to the mobile phone-receiving hardware. After the telecommunications hardware was acquired, another software package, FrontlineSMS was used to act as an intermediary between SMSs and the Crowdmap platform.

The community organizers had primary responsibility for recruitment of participants to contribute reports to the applications. We administered the messages on the platform and ongoing on-the-ground (e.g. attending community activities and handing out flyers in common areas) and online (e.g. community Facebook pages and Web sites) recruitment of participants. Similar to other crisis mapping initiatives, we geocoded messages and categorized contributions based on community concerns (e.g. rezoning, condominium development, and gentrification).

Findings

Our three cases in community development explicated the hyperbole in crisis mapping. The cases did differ somewhat in their implementation. For example, Montreal organizers assisted participants in entering the texts, and in another instance, participants entered their messages during a 1-day workshop. In Vancouver(i), residents contributed messages on their own. Montreal organizers codeveloped message categories and they geocoded any locations unknown to the

Table 1. Synthesis of our three case studies in the following communities: Montreal, Vancouver(i) and (ii).^a

Case/ description	Montreal	Vancouver(i)	Vancouver(ii)
Community description	Low-income immigrants and single family housing	Young, middle-class families living in subsidized student housing	Low income, multiple ethnicities, and renters
Intent	<ul style="list-style-type: none"> – Community assets – Community improvements – Healthy food – Youth engagement 	<ul style="list-style-type: none"> – Community assets – Community improvements – Anti-rezoning – Anti-densification 	<ul style="list-style-type: none"> – Anti-densification – Anti-rezoning – Social housing – Community plan
Duration	<p>1 year (2 applications created)</p> <ul style="list-style-type: none"> – First application was based on community assets and improvements, and it had few messages – Second application was based on one community event and its pre-workshops; application had few messages – Most of the time was spent adapting the context and technology to the community organizers' needs 	<p>2 months (application use ongoing)</p> <ul style="list-style-type: none"> – Application produced content that was included in a community and student report sent to land administrators land use changes considerations 	<p>1 month (application never launched)</p> <ul style="list-style-type: none"> – Time was allotted to meetings with activist and attending local events and meetings to get to know the community) – Although we were both passionate about the community, the suggestion for the new medium of communication did not align with organization's communication strategy
Participants	Professionals, adults, and youth	Activists, volunteers, and young families	Activist and volunteer-run groups, community councils
Recruitment	<ul style="list-style-type: none"> – Workshops – Flyers (made by community organizations) – Posters (designed by researchers) – Community organization meetings – Events – Storyboards (cartoon panels outlining the project and explaining the technology; used to present to community organizers) 	<ul style="list-style-type: none"> – Community events – Multilingual flyers (designed by activists and translated by community members) – Posters (designed by activists) – Meetings with activists – Storyboards (cartoon panels outlining the project and explaining the technology; used to present to activists and community organizers) 	<ul style="list-style-type: none"> – Meetings with activist to propose our application and explain the technology – Community public meetings

^aThe case studies include the description, intent, duration, and participant recruitment.

administrator. We engaged community organizers as members and as codesigners to reduce the epistemic closure cautioned by Burns (2014a). Differences and commonalities, as they relate to crisis mapping more generally, are reported below.



Figure 1. Ushahidi deployments' management of time (Blow 2010).

The zero cost argument

Meier (2012a) emphasizes the zero cost of developing crisis mapping apps: crisis mapping platforms have supposedly become so easy to use that application development is effortless. This is illustrated in Ushahidi, Inc.'s own 'Allocation of Time' (Figure 1). Time expended for technical development (the small circle depicts time allocated toward the 'Ushahidi setup') is advertised as low, whereas the much larger circle depicts 'All the other stuff' required for an Ushahidi application deployment. The small circle belies the significant skill level required to complete development because technical skills associated with the development process are also present in All the other stuff. 'Verification, documentation, integration with other systems, SMS debugging, and taxonomy development' are all critical components that require considerable technical expertise.

Crowdmap is the easier version of Ushahidi. However, our community development case studies revealed the difficulty in what is considered as easy. As an example, building the SMS portion of the application required telecommunications hardware and software, which, unlike the universality envisioned for the cloud, depends on a country's telecommunications' infrastructure and regulations. The modem required to receive SMSs was unavailable in Canada, so we acquired it from elsewhere, in this case the United Kingdom. The hardware and software required by FrontlineSMS operates with the global system for mobile communications (GSM) network, not the code division multiple access, which is prevalent in Canada. Our provider options narrowed, we entered a contract with a GSM network provider so our subscriber identity module card would match the GSM modem standard.

Free and open-source software (FOSS) is considered a prime feature of crisis mapping: the software is maintained by a user community; it is at no cost and, because it is open, customizable. FOSS, as part of the 'gift economy', has received as much, if not more, hype than crisis mapping (Zeitlyn, 2003). What happens when the gift economy does not manifest? One such example in our

case was a software bug whereby messages could be geocoded but content at those locations failed to display on the map. E-mails to the FOSS Frontline community generated no response. The first author tweeted the developers and was told by Frontline to report the bug on GitHub, the popular site for uploading and maintaining FOSS. No one examined the bug report. FOSS relies on a volunteer technical community that is sufficiently motivated to quickly solve technical issues, especially more prosaic bugs, and composed of large numbers of volunteers, presumably one of whom will take the time to address the problem. We eventually fixed the bug but, in interviews with community members, we identified no members sufficiently skilled to handle these obstacles to a functioning system. Despite being free, expending in-kind resources to ensure hardware/software apps run smoothly can subtract time from on-the-ground outreach and direct contact with participants.

Solving software problems is problematic for any under-resourced community (McIver, 2006). GitHub itself is intimidating for nontechnical users; according to interviews with GitHub users, 'it could be hard to find things, and I would never ask a non-technical person to use GitHub. Never' (Kalliamvakou et al., 2014). We cannot expect community-based organizations, and therefore many other potential users of Crowdfunder, to always attract an army of crowdsourcing-ready and technically savvy volunteers to support their specific applications.

Finally, we cannot underestimate the challenges induced by the technical ecosystem of Web mapping. Compared with traditional GIS, Web 2.0 mapping relies on a more dispersed and cloud-based set of distributed geospatial services comprised of individual firms and user communities. Among them are the mapping platform providers such as Google Maps, crisis mapping platform providers such as Ushahidi, Inc., geographic data providers (e.g. for up-to-date satellite imagery, which are frequently digitized by the crisis mapping user community like HOTOSM), coding user communities (e.g. FrontlineSMS), and providers of telecommunications hardware and network services. In this ecosystem, all components must remain interoperable to ensure functionality. During our research, Ushahidi launched a new version of Crowdfunder to emphasize its global reach (Leson et al., 2013). In New Crowdfunder, the user interface now opens with a global map rather than a customized map of a community. Ushahidi, Inc. also notified developers that current Crowdfunder applications may not be supported in the New Crowdfunder. Ushahidi, Inc. had initially committed to dropping the old Crowdfunder, now called 'Crowdfunder Classic', but relented under user pressure. New mapping platforms are promoted for community empowerment. However, a shift in control to outside actors has been found to destabilize those very communities where self-reliance in community development is encouraged (Burns et al., 2004; Florin and Wandersman, 1990).

Empowering the user through disintermediation

Like other Web 2.0 applications, crisis mapping supposedly eliminates the need for intermediaries. Our crisis maps repurposed for community development reduced the need for some intermediaries only to require new ones. Unlike traditional GIS, we needed no one to create the underlying map data or spatially analyze the posts. But similar to the GIS professional, someone still had to build the applications. In contrast to GIS, a new role was required: an individual with system administrator skills to maintain the app. In our cases, these positions were filled by the first author. Additional new roles included geospatial data curators, that is, individuals who parse locations from the SMSs. Despite the promise of automation, texts on these platforms are not automatically geocoded: someone must manually infer the location of the report. These individuals also needed to explain to potential contributors how to enter sufficient information in a 160-character SMS to

identify a location (e.g. 'Parc Rathwell' instead of 'at the park'). Introduction of informatics tools into community groups frequently demands numerous new skills (Gurstein, 2007; Leson, 2013). This runs counter to the hype that crisis mapping platforms inevitably lessens the distance between the tools and the public. Traditional disintermediation, for example, the elimination of travel agencies in favor of travel aggregator sites, embeds that assumption that easier-to-user interfaces assuredly de-skill (reduce) the complexity of tasks. Our experience found that crisis mapping imposed numerous new skills on members of the community-based organizations, skills they were not necessarily prepared to acquire.

We observed variations in skillsets brought to the projects. Participating community members did not possess requisite skills for the specifics of the applications but did possess social media skills. Vancouver cases used and were comfortable with Facebook; Vancouver(ii), in particular, frequently updated its community Web site, Twitter account, mail Listserv, and also a blog to present its community concerns. The Montreal organizing committee expressed excitement about the computer mapping app for its capacity to digitally showcase their community; however, they had no internal capacity to build a Web site or a Facebook page for community events. As much as we attempted to diffuse the skills (e.g. through manuals and tutorials), we were the ones gaining new skills in deploying telecommunications hardware and software with Crowdmap (SMS, e-mail, Twitter, and Ushahidi app integration) and their administration (parsing texts, daily updates, digital, and physical outreach).

Our cases explicate a nonexpert/expert as well as a local/remote tension in crisis mapping where it concerns empowerment. One definition of empowerment is giving voice to the voiceless and to the marginalized via the map (Rambaldi et al., 2006; Sieber, 2006). The mapping app in Vancouver(i), encouraged an online public dialogue among the residents about the value of specific sites (the app allows for comments on posts). Additionally, analysis of the map reports was used by Vancouver(i) to argue the residents' case before the housing estate's board of governors. If one defines empowerment as growth in technical capacity, including the ability to maintain the application over time, then the individuals being empowered were primarily the remote developers and not local residents. We gained skills more quickly because of our backgrounds in mapping but also because of our positionality. We could leverage our positions as educated and credentialed outside researchers (e.g. with access to resources like short courses and server space). When one examines the rhetoric of crisis mapping empowerment, it is evoked essentially as efficiency through saving time and money by exchanging skillsets and expertise from many different fields, which would then counter a lack of participation from otherwise 'passive audiences' (Norheim-Hagtun and Meier, 2010: 83). This increased engagement and upskilling seems almost exclusively focused on the passive audience of external volunteers. Crisis mappers may be neogeographers, bringing new skills and new voices to the nonexperts (Turner, 2006), but it does not mean that the mapping apps empower the community resident. Crisis mapping may serve to further empower the expert or the educated lay person.

Local matters, particularly in real life (IRL)

Meier argues that '... disaster-affected locations are increasingly becoming digital communities, due to the proliferation of social media ...' (Meier, 2013). *Contra* Meier, Morrow et al (2011) found that Ushahidi did not represent a credible source to affected communities. Haiti was not becoming a digital community: Ushahidi was too new and the platform had unclear parameters. Social media and computerized mapping cannot replace the physicality of meetings and other IRL

social encounters that provide greater context for an event (Gao et al., 2011; Morrow et al., 2011). Our research underscored the importance of physicality and local context for crisis mapping.

Community development is an intensely labor-intensive and high-contact face-to-face activity (Bhattacharyya, 1995; Burns et al., 2004; Lyndon et al., 2011). Community development research assumes that both the developers and the participants are local, the emphasis being on building local capacity (Bhattacharyya, 1995; Burns et al., 2004; Lyndon et al., 2011). We, in collaboration with our cases, explored whether crisis mapping could be repurposed for what could be considered an 'edge case'. In crisis mapping, users are local but almost exclusively developers are distanced, even if they have local connections (e.g. Haiti diasporic community in Boston). In our cases, the experts were expected to be local and the researcher developers were expected to be physically present during development and initial deployment. Indeed, we would argue that the repurposability of crisis mapping depends on intensive building of a local technical base, which is problematic when no local technical experts can be found to be upskilled.

A sustained physical presence was found to be critical in the communities for numerous reasons. After the initial technical setup, the recruitment process began, followed by Web site administration and upkeep. Recruitment was a physical process. We were in the community every few days, to distribute flyers or to speak with parents at various community events. We became familiar with the built environment and popular areas, aware of activities listed on physical bulletin boards, taking opportunities to speak with activists and discovering community events that we may have otherwise missed. This familiarity in Vancouver(i), for example, allowed us to discover recruitment could be increased if we advertised in various languages (i.e. Mandarin, Korean, Spanish, and Farsi).

Implementation was demarcated into stages in which community members shifted media preferences to customize the application. In Montreal, organizers communicated via e-mail the changes/edits to Crowdmap. Organizers did not respond to similar e-mail request to supply feedback on the manuals/tutorials. These documents covered application administration and were reported as too difficult to articulate changes in written form. Changes required numerous face-to-face interactions to improve documents for actual use. This represents:

a recognition of the value-added both by the virtual connections (information at a distance and access anytime, anywhere) and of face to face connections (the opportunity to rapidly build trust and to overcome the ambiguities and distortions of computer mediated communication). (Gurstein, 2007: 24)

We gained trust via a physical presence, a key factor in aligning researcher goals with those of the community (Sullivan et al., 2001). In turn, that alignment garnered a sense of reciprocity: the researcher invests time and resources in a community and, presumably, the community then invests in his/her research. For instance, the Montreal organizers were pleasantly surprised that the first author attended and participated in a 1-day community event, after long months of negotiations/changes/adaptations in the project. The Montreal community organization had worked with students before, knew of the difficulty, and wanted to return the researchers' investment (e.g. for time, for the mobile phone plan, and the printed map posters). While we were concerned that contributions supported community goals, organizers were quite concerned that we were obtaining texts appropriate to researchers' goals. Trust induced a sense of commitment by the community to see the project succeed. Physicality extending beyond the immediate aftermath of a crisis could better ameliorate the 'tension [found by OCHA] to understanding the different levels of

engagement, activity and priorities between different actors operating in the same environment, including those operating virtually from a distance' (Searle and Wynn-Pope, 2011: 2–3).

Vancouver(ii) provided the starkest reminder of the need for the physical connectivity. We observed the community's consultation process with the city where we tracked the hostility between the city planners and the community. What we did not know was the city had engaged in a prior interactive digital mapping project. Prior knowledge of the longer term history of distrust with the city and the distrust of technology would have generated a different approach. Our use of crisis mapping tools confirms the importance of the milieu of application development, even if the apps are cloud based. If the mapper (or the mapping app) parachutes into a situation, as has been the critique of many humanitarian projects, the community may choose not to respond. Local knowledge – that is, the external developer appreciating local context – is an issue well known in the community informatics and participatory mapping community (Gurstein, 2007; Sieber, 2006) but is only becoming appreciated in the crisis mapping community.

Temporality for repurposing

We found that a crisis map cannot be easily repurposed to community development. A large part of the difficulty, we argue, is that crisis mapping appears suited for a particular definitional knowledge politic. Crisis events manifest in a particular moment and appear to have a short duration. Chronic events span greater temporal periods and maintain a persistent presence. Determining the acuteness of an event depends on how one defines the beginning and end of a crisis. According to Okolloh (2009: 67), 'Humanitarian-based crisis situations do not usually start with one flashpoint. They generally result from a number of events and factors that have happened over time'. Increasingly, disasters are perceived as ongoing, complex sociotechnical events (Fordham, 1999; Frickel, 2008). There may be disagreement among the mapping actors as to the existence or importance of a flash point. More importantly, this evokes the power to effect an epistemic closure (Burns, 2014a) on the designation of an issue as a crisis.

Vancouver(i) illustrates the complexity of temporality in defining a crisis. Of all our cases, Vancouver(i) was the closest to a crisis situation where an entire community of residents was being evicted from its housing. The reasons for eviction, however, lay in longer term structural problems. Vancouver is the most expensive city in Canada (Siscovick, 2014) because of its clement weather, nearness to recreation (e.g. sailing and skiing), and also because Vancouver offers an ideal location to 'park' global capital. These factors have resulted in a severe lack of social (public) housing in the greater Vancouver area. An example post from Vancouver(i) implied both chronic (e.g. land rezoning and social class) and acute issues (e.g. imminent displacement):

Now that the courts are in the final stages of decommissioning, there are no playgrounds on the south end of [Vancouver(i)] for families to access. I realize it is not a long walk to the commonsblock, but it would be great to have access to even a small playground right outside our apartment building, especially since we are higher density and don't necessarily have ground access like the fortunate families living on the north side of the neighbourhood. (Participant message, August, 2013)

Based on our research, we would further argue that issues diagnosed as chronic appear to be less attractive to outsiders because they are seemingly intractable and not amenable to the quick fix envisioned by technology. As noted by Nixon (2011: 6; in Brandusescu et al., 2014), chronic events receive less attention than crisis-based events due to an 'unequal power of spectacular and unspectacular time'. Nixon (2011) refers to a kind of slow violence, the structural,

extra-jurisdictional factors that defy the definition of events as singular, acute points in time. Crises in communities are often chronic and are ongoing, and the role of community development research is to bring awareness and encourage processes that can alleviate protracted historical processes (Burns et al., 2004; Lyndon et al., 2011). Community issues align less well with spectacular violence than with slow violence.

The chronic nature of community development, we believe, contributed to a low number of reports on our apps: Montreal, 56 posts; Vancouver(i), 61; Vancouver(ii), 0. (Another possible reason for low numbers is the hyperlocality of community development, which occurs in small spatial extents – for example, a neighborhood, a block – and affects fewer people, although hyperlocality is considered a feature of crisis mapping.) Despite advertisements of reach, more than 90% of the over 12,000 Crowdmap apps generate less than 10 contributions (Bailard et al., 2012: 3). In our cases, we observed little sense of urgency that could potentially overcome technical hurdles and exhort residents to comment. We would argue that very few issues, chronic or acute, will likely generate the large numbers of contributions. This reveals the alignment of crisis mapping with the rhetoric of big data: these crowdsourced apps are attractive to researchers and the public at large because of their potential to marshal thousands of people and posts. This is consistent with an emergent epistemology – a way of knowing data – on cloud-based platforms. Big data epistemologies implicit in crisis mapping focus on explicit numerical data analysis of large volume and velocity, instead of ‘highlighting qualitative understanding, communal and situated lay knowledges’ (Burns, 2014b: 10). Even big data researchers acknowledge the value contained by smaller data sets that can be lost in the big data (boyd and Crawford, 2012). For us, a focus on big data renders the introduction of ICTs into a community, a stream of data products valued by its volume and not the process by which the data were produced. We should question whom the rhetoric of big data serves and whether the success of a crisis map should be assessed by the numbers.

Finally, temporality also refers to the connection between reporting and response. Norheim-Hagtun and Meier (2010: 87), reporting on the use of Ushahidi in Haiti, suggested that the application generates a perception of immediate assistance: ‘Haitians were being asked to text needs and location into 4636, yet the shortcode was set up without any formal guarantee of action by any local responder’. In Montreal, a mother, who reported a damaged playground wondered that, if she reported the issue to the mapping application, would a city official fix the playground so she could allow her child to play. The applications insinuated both an immediacy of contribution in its access and ease of use but also an immediacy of response. There is an expectation in crisis mapping where the urgency of a reported event creates a direct connection between action and reporting, which as stated is not always the case.

Conclusion

In this article, we explored the reality behind the hype of crisis mapping and revealed that hype through its repurposing to community development. We confronted the zero-cost argument and found numerous technology constraints, which confirmed the challenges of introducing a new technological medium to community development processes. Our integration attempted disintermediation but exposed new gatekeepers, which included the intrusion of social entrepreneurs and the private sector. The projects served to empower the researchers more than the community participants in terms of the skillsets that were brought to the project. We had to be mindful of epistemic closures during the process and longevity of the applications, particularly in aligning our goals as researchers to the community’s goals. Applying crisis mapping to community

development relied on physical participation of researchers in the communities. Finally, we found something intrinsically ‘short-term’ embedded in the technology that rendered it complicated for more chronic crises like community development.

The communities with which we collaborated reported positive experiences with the projects. In Montreal, participants were keen to add their favourite places to the map and curious to monitor the ongoing process and outcome of the app. Vancouver(i) organizers found the mapping allowed residents to coalesce thoughts about community assets and mobilize during a time of crisis. Even the organizer of Vancouver(ii) expressed appreciation of the mapping platform, although ironically at a time when the community was not undergoing a crisis. Burns (2014a) asserted that knowledge politics concerns the role of power in developing a map but the politics also refers to the overall hype to which we so easily succumb. If we acknowledge and then work past the hype then perhaps we will achieve more meaningful and sustainable systems.

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