

Where to draw the line? Approaching a scale to negotiate in-situ civil involvement for the inquiry of crisis information

Amro Al-Akkad, René Reiners, Marc Jentsch, Andreas Zimmermann
Fraunhofer Institute of Applied Information Technology FIT
Schloss Birlinghoven, 53754 Sankt Augustin, Germany.
{*amro.al-akkad | rene.reiners | marc.jentsch | andreas.zimmermann*}@.fit.fraunhofer.de

Abstract. Recent crises have given examples for ways citizens exploited their mobile phones' capabilities in order to contribute to emergency response work. Thus, there is already a *new emerging collective capacity of humans* using ever-more-capable mobile phones as an enhanced ubiquitous tool for mobile data collection. However, in this paper we argue that at the same time there is a need to take into account **ethical**, **legal**, and **economically justifiable** issues when involving the public in emergency response work. Hence, at some point it is necessary to draw a line—up to certain situations it might be acceptable that a citizen acts in an emergency situation, but there are definitely boundaries that may not be exceeded. Our research aims at approaching a scale adjusting the reasonability in which citizens might be involved in data collection for the common good in emergency situations and when any involvement needs to be avoided.

Introduction

This workshop paper concerns the need to consider ethical, legal and economically justifiable issues for in-situ civil involvement during crisis response. For this, the possibilities and limitations of civil involvement are summarized. Afterwards, we illustrate why it is reasonable to approach a scale for involving civilians on-site in order to collect (potentially meaningful) data.

Motivation: Citizen Commitment in Crises

Some recent crises¹ exemplify how citizens can exploit mobile phones in order to contribute to emergency response work. In the following, we briefly outline three crises where citizens published by the means of cell phones data reflecting crises situations:

In 2005 the London tube bombings set a new trend of in-situ crisis citizen communication. Ordinary members of the public wearing cell phones embedding camera functionality captured images and videos of the underground bomb blasts, and later on published those media content on websites and blogs (Day and Johnston 2005), which finally made their way to the traditional media channels (radio, TV). However, the impact of the bomb attacks created such severe structural damages in specific places that left people trapped in the underground. Although, victims were able to record media (photo & video), they were not able to immediately report this data to the outside world due to the lack of coverage of the mobile phone network in the subway and a general failure of the telecommunication infrastructure supporting emergency services (Palen and Liu 2007). Though, these data was later on eventually forwarded to the authorities and became helpful in the investigation, and also broadcasted in the world news.

In 2009 an airplane crash of Turkish Airlines upon landing at Schiphol Airport (Amsterdam International Airport) killed nine persons and another 86 were injured. This accident happened just a few meters off a main road. Passing cars stopped and people stepped out of them to be the first documenting the disaster site: they used their cell phones in order to post messages on Twitter², to take pictures or record video (CNN International 2009). Furthermore, some people uploaded their recorded media at iReport³. For instance, pictures of a live rescue operation were available at iReport (CNN iReport 2009). CNN news dealt with it in a very professional way, i.e. they stated initial reports to be eyewitness' reports and unconfirmed by authorities⁴. Although, from a legal perspective CNN did not want to guarantee the correctness of the truth, at the same time they tried to inform the public to some extent.

In 2010 a stampede during the 'Love Parade' music festival organized in Germany caused the death of 21 persons and over 200 people were injured (Spiegel Online 2010). During the crisis some visitors used their mobile phone to take pictures or record video of the ongoing incidents. Straight afterwards some visitors shared their media and experiences on a dedicated blog (Love Parade Blog 2010). In the beginning the multitude of media confused the society. But, as soon as the flow of uploaded data decreased and the first data sets were analyzed, the overworked data collection shed more light on the intrinsic, complex reasons for this incident.

¹ We use the term "crisis" in our work to express, as best as terms allow, large-scale emergency activity that includes natural disasters (flooding, earthquake, avalanche etc), terrorist attacks, but also might include other kinds of events, e.g. a stampede.

² Twitter is an online platform to communicate world-wide with other people. It allows users to broadcast 140-character messages (tweets) to groups of other users. Users can become 'followers' by subscribing to specific user accounts. <http://twitter.com/#>

³ iReport is a CNN citizens journalism initiative. It provides an online space provided by CNN to share video, photo, or audio that can be uploaded from a computer or cell phone. <http://ireport.cnn.com/>

⁴ We use the term "authority" in our work to refer to public emergency organizations. If we use the term 'organization' authorities' are included, but also non-governmental organizations (NGOs).

Status Quo: Usage of Citizen-generated Data by Organizations

In the shape of field tests there exist already some cooperation between citizens and authorities. For example, a survey from Ireland conducted by Alderson (2011) shows that citizen-generated data being published on facebook has the potential to improve both the relationship between the local police and the citizens and in particular help to lower crime rates. Furthermore, recently the first author of this paper met a police officer from the Netherlands who reported that the study of (Alderson 2011) has motivated his colleagues and him to benefit from the public by the usage of social media tools in order to fight against crimes. Further, another German police officer (Wolf 2011) reported to the first author of this paper that his department once had used facebook for asking citizens to help them. Although, this caused a lot of administrative effort and required special permissions, in the end this approach worked well. There are further projects, such as SafeCity (Tilburg City 2011), that involve ordinary members of the public in order to support authorities to handle crisis.

Though, all references do yet reach not a level of large-scale crises, but rather are placed on small-scale crimes level. In this context, the Ushahidi⁵ open source platform is worth to mention, being a proven system to which mobile phone users within spitting distance of severe events can send crisis information via SMS or email. For instance: *Who needs medicine? Which people have been expelled from their homes? How many people have died and are injured?* Received texting reports are categorized and then put onto a Google Map based live map. For example, during the Haiti earthquake crisis Ushahidi had helped to be able to rescue missed victims (Guardian 2010). The platform is still used in current crisis regions. For instance, there is a live map⁶ for the Japan large-scale crisis that has emerged due to a number of earthquakes, tsunamis, and unfortunately those two natural disaster types had contributed to the outbreak of a nuclear catastrophe at Fukushima nuclear plant (Al Jazeera 2011).

Related Technical Work

Due to their sheer ubiquity cell phones qualify themselves excellently for mobile data collection. In particular, their widespread adaption as a technology by people across many demographics, but also the continuous trend towards ever more-capable devices—both in the number of sensors (as GPS, microphone, acceleration, or integrated camera) and their quality attributes (as range, accuracy, resolution, or robustness)—constitute a potential to exploit mobile phones as well for the involvement of the public into crisis response. At this, the study of Wirz, Roggen et al. (2010) shows that there is a good acceptance in public society to exploit mobile phones for contributing to the handling of emergencies.

Participatory Sensing

Mobile data collection by the people for the people and interpreting some information of this shared data is an approach that is called *participatory sensing*. Manifold research has been undertaken involving a collective of humans wearing smart phones for collecting dynamic data in unprecedented ways:

- Kanjo, Bacon et al. (2009) leverage a mobile sensing framework for monitoring the air quality in urban areas. For this local cyclist—of a courier company—wearing off-the-

⁵ Ushahidi open source platform, <http://www.usahidi.com/>

⁶ Ushahidi live map of Japan, <http://www.sinsai.info/usahidi/>

shelf cell phones are equipped with environmental sensors collect dynamic data while doing deliveries.

- Paulos, Honicky et al. (2008) launch a set-up where taxi drivers can share their personal routes among each other, besides exploiting cell phones to log environmental pollution data.
- Shilton, Ramanathan et al. (2008) involve inhabitants of two neighborhoods in Los Angeles to assess the ‘walkability’ of pavements. For this pedestrians can take a picture of any impediment, which is then geo-tagged and send to a central database server. The total amount of collected data serves later as an input for urban planning.
- Merchant, Abella et al. (2010) investigate to which extent (prerecorded) audio instructions transmitted remotely to bystanders’ cell phones, can support bystanders to improve the quality of providing a cardiopulmonary resuscitation (CPR); untrained and trained lay rescuers were evaluated. Their results prove that remote audio constructions supported bystanders to improve the quality, though the results of their study indicate no difference between trained and untrained participants.

Though, research is scarce on how data collected by citizens on disaster sites can have an impact on the handling of emergencies. Furthermore, there exists no real-world system deployment to apply participatory sensing for emergency response work. Last described above participatory sensing example application does not imply any stress as a real crisis would imply. Al-Akkad and Zimmermann (2011), for instance, envision two emergency situations where bystanders’ mobile phones may be exploited to automatically collect data such as location or acceleration, and further manually taking and sharing pictures of a disaster site is another option they suggest for data acquisition.

Approaches of Participation Patterns to Participatory Sensing

Ways on how to apply participatory sensing approaches and how to involve the public may vary. Goldman, Shilton et al. (2009) elaborate among others two participation patterns to participatory sensing:

- *Collective Design and Investigation*, i.e. the sensing process is initiated by the community of participants.
- *Public Contribution*, i.e. a group of individuals collects actively data in response to inquiries by another individual or organization.

The Schiphort airplane crash in 2009 (cf. first chapter) represents sort of a mixture approach to both participation patterns listed above. At first, the collective initiates data gathering, though with the difference that the participants are not really aware of each other as a collective community. Rather they act by common sense, as it might be useful for the common good. Then, there is a public contribution to some other organization, though the inquiry is rather implicit, as the common principle platforms as iReport, or Twitter is to spread around breaking news reported by any citizen.

However, we argue there is a gap investigating the boundaries of when it is critical or not critical to inquiry people to support the handling of emergencies, e.g. to broadcast live video of an incident site that includes people that are in harm. Hence, besides pushing technology forward by releasing more-capable mobile devices that represents a potential to benefit from public involvement during a crisis, we need to approach a scale supporting us to identify from an ethical and legal point of view when it is justifiable to involve citizens.

Scaling civil involvement for on-site data collection

Viewpoint

We do not take up a stance on people generating data with the hope being explicitly helpful for crisis communication, though we have seen that the recent past has proven that some considerable part of our society is ‘media-savvy’ (Day and Johnston 2005), i.e. those people will anyway—no matter if being asked for—put information on social media applications as facebook, or Twitter. This behavior is the result of two social-cultural developments:

- People have appropriated to use cell phones for taking photos or recording video in their daily life.
- People got used to report their use of context on social media and other places being online available.

However, if in emergency response work usual citizens, i.e. non-professional people, such as victims or bystanders, get involved we always stumble across *ethical, legal or economically justifiable issues*. We can think of hardly overcoming all three issues at the same time.

In all above examples (cf. Motivation sub chapter) citizens exploit their mobile phones for in-situ data collection in the course of a crisis: citizens utilize mobile phones to be the (first) crisis reporters, and by hindsight to enlighten partly the genesis of a crisis. In this paper we argue that, besides benefiting from a *new emerging collective capacity of humans* using ever-more-capable mobile phones as an enhanced ubiquitous tool for mobile data collection, at the same time there is a need to take into account ethical, legal, and economically justifiable issues, which we will elaborate in the following by labeling each issue with one example:

- Is it *ethically* acceptable to document as a civilian journalist a crisis where people are injured and share this data, although one whole picture might have the potential to contribute on the course of disaster resilience? Further, is it ethically defensible to automatically request mobile data from people who already died in a crisis? For example, by switching on their microphone to listen to what is happening at the incident site?
- Is it justifiable (from a *legal* viewpoint) to inquire data collection from a civilian journalist, a person who is not trained well to act in emergency situations? What happens if those may suffer from a post trauma after documenting strongly injured or even dead people?
- Is it *economically arguable*, if data collected by civilians (in shape of text messages, pictures, videos, or audio) is misinterpreted or if data is manipulated on purpose? For instance, the command centre receives a set of pictures that do not reflect properly the crisis, though based on this wrong information the command centre prepares improperly the fire brigade, and thus the dimension of the infrastructural damages is unintentionally increased.

We believe that all three aspects are highly relevant when involving the public in the very early phase of a crisis where it is still in an ongoing process where the situation awareness (Harrald and Jefferson 2007) is blurrier than in later phases, i.e. the overall picture of a crisis becomes usually later on more visible among different response units and the public. Although, the technological advances in ICT are very promising and at some point even tempting, the involvement of civilians for reasonable situations needs to be as much as possible regulated and controlled as well. Heroicity and unawareness of dangers for life need to be avoided at all costs. We aim at approaching an adjustable *civil involvement scale* that

regulates and controls properly the civil involvement for data collection in emergency situations.

Design Problems

From an information design perspective one question that arises is: *How much details are appropriate and how little is sufficient? And, this scale does it change to the context (Zimmermann, Lorenz et al. 2007) a civilian faces in a crisis?* From our perspective, the grade of detail depends on the type of medium; for instance, in case that it is not alright to broadcast live video from an accident site, maybe it is acceptable to make a verbal phone call and inform the authorities that an accident has happened—as mentioned above the positive result of Alderson’s field test (2011) already shows that this is doable.

Another position is the way of acquiring the data:

- Is it appropriate to send your position, once or ongoing?
- Is it allowed to send a picture or a series of pictures – also from other people or victims?
- Is it appropriate to broadcast live video or better record an enclosed video and afterwards send it?
- Are privacy bruised when live videos are broadcasted?

Thus, basically the main challenge when involving citizens for on-site crisis data collection concerns the definition of the evaluation parameters and the thresholds when what kinds of measures should be taken and can ethically and legally be justified.

Discussion on Crisis Information Flow

During a crisis the information flow between citizens and emergency response organizations can be bidirectional. Both approaches have their pros and cons:

- On the one hand, if the citizens provide data to emergency organizations without being asked for, there is the danger for organizations to cope with a data flood making it difficult to filter out the really important information.
- On the other hand, if organizations inquire citizens to collect data for them, the organizations need to deal with the responsibility of engaging non-professional people in hazardous situations.

Obviously, when organizations are the driving force for data collection, they can constrain the kind of required data and how it is shaped. For instance, the fire brigade could make a specific request *“We can prepare the firefighters to do a better job, if we could get a clearer picture from this angle of the disaster site.”* If bystanders are near to a disaster site, and receive such an inquiry they might be able to provide the relevant piece of the puzzle. Though, Shilton, Ramanathan et al. (2008) indicate that the latter approach might impose creative limits on participant groups, as it narrows down the information space on mobile data collection by participatory sensing systems supporting only *“what information do you need to know?”* rather towards systems supporting *“what could help you find that out?”*

Tapia, Bajpai et al. (2011) point out that authorities so far rejected to make decisions upon unrequested data provided by the public often through social media, as Facebook, or Twitter, as it deemed to be unverifiable and untrustworthy. Also, in February 2011 during the Syrian uprising the profile of Amina Abdallah Arraf al Omari⁷ was created identifying herself on her

⁷ Wikipedia: Amina Abdallah Arraf al Omri, http://en.wikipedia.org/wiki/Amina_Abdallah_Arraf_al_Omari

blog as a Syrian lesbian asking for more political freedom. Afterwards, in June 2011 it turned out that the blogger is a fake identity. This has foregone support of freeing Amina from her kidnapping having received the remarkable number of 13.105 people on facebook who would like her freeing.

Not least, we can say that each way of direction designates an intrinsic complex dimension. If the public is the actor, the emergency organizations need to dare taking responsibility upon the usage of data collected by non-professionals; although, this attitude of ‘non-professionals’ might be too rigid: for instance, during the ‘Love Parade’ music festival crisis in Germany (cf. first chapter) professional photographers (in their free time) took pictures of the crisis. However, if the organizations are the driver for in-situ crisis data collection by civilians, they as well do not dare to take the responsibility to ask people for help that are usually untrained to cope with tasks in hazardous situations.

Further Issues

Initiating a direct communication channel between authorities and citizens designates some level of agreement. What information the user is willing to publish and which information is subject to keep it for restrictive use. To which extent a user is willing to react to requests in order to gather data is a central question for establishing participatory sensing applications, that so far only Lane, Eisenman et al. (2008) have partly answered. At this, the German police state department of North Rhine-Westphalia has launched an iPhone App⁸ while applying a rather flexible, transparent approach that has received quite positive feedback among its users (Mosel 2011). Their strategy is to serve the user basically two possibilities. At first, to show the user explicitly the data content of a token that the application transmits. And second, to allow the user to configure which data flows into a token.

Also, a negative phenomenon that might appear due to an established communication channel between response organizations and citizens is the misuse by people who seek for attention. For example, a bystander taking pictures of a burning building is at the same time the person who set the fire. In the recent past, firefighters who were aiming to reach a heroic reputation committed such criminal acts. For instance, Fischer (2004) describes in his report a case of a 32 years old member of the fire brigade in Jülich, a town in the middle district of North-Rhine Westphalia, Germany, who has confessed being responsible for setting a fire to a multi-family house, in which six people have died.

We believe ethical and legal issues are very much also social issues. There are even more social issues, such as social work practice or social acceptance. Though, covering those issues goes beyond the scope of this paper.

Conclusion and Outlook

Citizens equipped with enhanced mobile phone technology at a disaster site, such as victims or bystanders, can be considered as one emerging party that can be useful to support disaster resiliency. We believe that two axes must drive public involvement for emergency response works:

- In the first place, enhanced mobile communication and mobile sensor technology is required. Nowadays, industry is already paving that way by putting more-ever-capable mobile devices on the market.

⁸ Gemeinsam mobil: Die offizielle App der Polizei NRW, <http://itunes.apple.com/de/app/polizei-nrw/id418346277?mt=8> and <http://www.polizei.nrw.de/service/polizei-nrw-app/article/polizei-nrw-app.html>

- Also, the research community needs to consider early enough: *ethical, legal and economical justifiable aspects*.

Considering both aspects will support more properly the design of digital artifacts that can shape future emergency response work along the expectations of the public and emergency organizations.

However, open questions remain in order to implicate open design questions, such as:

- *What are ways of verifying citizens' journalism?*
- *How can organizations give citizens feedback how useful the sharing of their collected data was or was not?*

With regard to the former question *Ushahidi* awards incentives for truthful reporters and punishment for untruthful reporters, though their verification process has a quite larger space of time, as the focused one would allow for.

This work mainly underlines the importance to consider ethical, legal and economically justifiable issue for in-situ civil involvement during crisis management. Further, potential negative consequences were sketched. Though, for future work we need to go beyond this surface: in the frame of an ongoing European research project we will try to look for ways how to approach evaluation parameters for our vision of a *civilians evolvment scale for crisis situations*. Our next steps will lead to organizing workshops with different crisis stakeholders from the authorities via experienced citizen journalists and not least to non-governmental organizations (NGOs).

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References

- Al-Akkad, A. and A. Zimmermann (2011). User Study: Involving civilians by smart phones during emergency situations. ISCRAM'11, 8th International Conference on Information Systems for Crisis Response and Management. Lisbon, Portugal.
- Al Jazeera (2011) Blog - Japan in crisis: March 15, <http://blogs.aljazeera.net/live/asia/japan-crisis-march-15>, Date Accessed: 2011-03-15.
- Alderson, M. (2011) Facebook: a Useful Tool for Police?, <http://connectedcops.net/?p=3637> Date Accessed: 2011-06-25.
- CNN International (2009) Twitter first to publish dramatic crash pictures, <http://edition.cnn.com/2009/WORLD/europe/02/25/twitter.amsterdam.plane.crash/>, Date Accessed: 2011-05-19.
- CNN iReport (2009). Turkish airliner crashes near Amsterdam airport (Tags: plane_crash, turkish_airlines), <http://ireport.cnn.com/ir-topic-stories.jspa?topicId=219704>, Date Accessed: 2011-05-19.
- Day, J. and C. Johnston (2005). Public provides new dimension to media coverage, <http://www.guardian.co.uk/media/2005/jul/08/attackonlondon.digitalmedia>, Date Accessed: 2011-06-19. The Guardian, guardian.co.uk.

- Fischer, R. (2004). Brandstiftung durch Angehörige der Freiwilligen Feuerwehr (pg 33-38), online available <http://www.feuerwehr-siegburg.de/content/download/berichte/2004/DER-FEUERWEHRMANN-01-02-2004.pdf>. Der Feuerwehrmann. 1-2/2004. Landesfeuerwehrverband Nordrhein-Westfalen e.V.
- Goldman, J., K. Shilton, et al. (2009) Participatory Sensing: A citizen-powered approach to illuminating the patterns that shape our world.. Woodrow Wilson Center for International Scholars, May 2009.
- Guardian, T. (2010) Ushahidi: crowdmapping collective that exposed Kenyan election killings, <http://www.guardian.co.uk/news/blog/2011/apr/07/ushahidi-crowdmap-kenya-violence-hague>, Date Accessed: 2011-05-22.
- Harrald, J. and T. Jefferson (2007). Shared Situational Awareness in Emergency Management Mitigation and Response. System Sciences, 2007. HICSS 2007. 40th Annual Hawaii International Conference on System Sciences, Waikoloa, HI IEEE.
- Kanjo, E., J. Bacon, et al. (2009). MobSens: Making Smart Phones Smarter. MobSens: Making Smart Phones Smarter, IEEE Pervasive Computing **8**(4): 50-57.
- Lane, N. D., S. B. Eisenman, et al. (2008). Urban sensing systems: opportunistic or participatory? Proceedings of the 9th workshop on Mobile computing systems and applications. Napa Valley, California, ACM: 6.
- Love Parade Blog (2010) Documentation (in German) of the incidents that happened during the mass panic at the Love Parade event, <http://loveparade2010doku.wordpress.com/>, Date Accessed: 2010-12-18.
- Merchant, R. M., B. S. Abella, et al. (2010). Cell Phone Cardiopulmonary Resuscitation: Audio Instructions When Needed by Lay Rescuers: A Randomized, Controlled Trial. Annals of Emergency Medicine **55**(6): 538-543.e1.
- Mosel, F. (2011) Polizei NRW App liegt bei Nachrichten vorne, <http://www.appleticker.de/polizei-nrw-app-liegt-bei-nachrichten-vorne.html>, Appleticker.de, Apple News.
- Palen, L. and S. B. Liu (2007). Citizen communications in crisis: anticipating a future of ICT-supported public participation. Proceedings of the SIGCHI conference on Human factors in computing systems. San Jose, California, USA, ACM.
- Paulos, E., R. Honicky, et al. (2008). Citizen Science: Enabling Participatory Urbanism. Handbook of Research on Urban Informatics: The Practice and Promise of the Real-Time City. Hershey, PA, IGI Global.
- Shilton, K., N. Ramanathan, et al. (2008). Participatory design of sensing networks: strengths and challenges. Proceedings of the Tenth Anniversary Conference on Participatory Design 2008. Bloomington, Indiana, Indiana University.
- Spiegel Online News Magazine (2010) Reports of the Love Parade Catastrophe, <http://www.spiegel.de/international/germany/0,1518,745908,00.html>, Date Accessed: 2011-12-04.
- Tapia, A., K. Bajpai, et al. (2011). Seeking the Trustworthy Tweet: Can Microblogged Data Fit the Information Needs of Disaster Response and Humanitarian Relief Organizations. ISCRAM'11, 8th International Conference on Information Systems for Crisis Response and Management. Lisbon, Portugal, ISCRAM.
- Tilburg City News, (2011) SafeCity app helps to assess unsafe situations, http://www.tilburg.nl/english/ep/channelView.do?channelId=-10518&programId=11848&pageTypeId=10671&contentTypeId=1001&displayPage=%2Fep%2Fchannel%2Ftl_channel_related_content.jsp&relCntPage=%2Fep%2Fcontent%2Ftl_ed_ne_content.jsp&contentId=35388, Date Accessed: 2011-06-27.
- Wirz, M., D. Roggen, et al. (2010). User Acceptance Study of a Mobile System for Assistance during Emergency Situations at Large-Scale Events. 3rd International Conference on Human-Centric Computing. IEEE. Cebu, Philippines.
- Wolf, S. (2011). Personal Conversation with Representative of Task Force Internet, Hesse State Office of Criminal Investigation, Germany, Conversation during the 1st European Workshop on Social Media as a Tool for Police Communication, June 15th 2011, Sankt Augustin, Germany.
- Zimmermann, A., A. Lorenz, et al. (2007). An operational definition of context. Proceedings of the 6th international and interdisciplinary conference on Modeling and using context. Roskilde, Denmark, Springer-Verlag: 14.