

Survey: ICT-supported public participation in disasters

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ABSTRACT

In an increasingly networked society citizens at disaster sites utilize information and communication technology (ICT) to communicate needs or to share information. In order to understand better emergent possibilities and implications of applying ICT for supporting public participation in disasters, we surveyed 57 respondents regarding several key user aspects as perceived usefulness, socially related issues, or deployment. Surprisingly, our results show a clear tendency to use a disaster specific application instead of using everyday services as facebook or Twitter. However, such application poses the risk to loose its focus fading slowly away after once downloading it. Further study is needed to understand if these results are representative regarding public society.

Keywords

Survey, public participation in disasters, ICT, and participatory sensing

INTRODUCTION

The last decade has shown several examples for public participation in disasters where the public initiated itself a response process by exploiting information and communication technology (ICT), e.g. London 7/7 bombings in 2005 or the 2010 Haiti earthquake. Palen et al. (2007) underline that public participation is an emerging phenomenon having implications on disaster management. According to Plotnick et al. (2011) citizen participation is one of the most underutilized resources of emergency management. In disasters citizens can consume and produce data being distant or at disaster site; this study focuses on the latter. Dynamic data collection in the field via mobile phones in close cooperation with the owner of a device Goldman et al. (2009) denote as *participatory sensing*. This paper presents survey results of using ICT to support public participation in disasters. For this the survey sampled key user aspects as described below trying to address our research question: *What are emergent possibilities and implications when using ICT in order to support more properly public participation at disaster sites?*

METHODOLOGY

The survey was conducted in 2011 during the international CONET¹ summer school, which focal point was on networked embedded systems and ubiquitous computing and their relationship to humans. We asked participants personally to complete the survey and made once an oral announcement before a lecture. Beforehand, we checked without success at a website² for similar surveys. We kept the number of questions below ten and used rather closed questions, as based on the outline we anticipated limited leisure. The goal was to allow for completion between five to ten minutes. Besides, an internal test, also an external statistics professor did a review. We used Microsoft Excel to process the sampled data and to generate charts from it.

The questionnaire is composed of 10 questions that were optional to answer and the possibility to give further feedback. First, we queried demographics, i.e. age, gender, role at work, and academic background. Next we focused on the perception or estimation of how participatory sensing may

¹ CONET Summer School, <http://www.cooperating-objects.eu/school/2011>

² Search Through Survey Instruments, <http://survey.aisnet.org/>, Association for Information Systems,

support public participation in disaster. This section poses the risk to get biased answers as before distributing the questionnaire sheet—on the first day of the summer school—a lecture about participatory sensing and its impact was given, though the lecture did not cover its usage for hazardous and time-critical domains. Not least, we dealt with its deployment. As the study of Wirz et al. (2010) sampled that smartphones are the preferred device, we skipped such question.

RESULTS

1st Section - Demographics

71 persons received the survey out of which 57 (80.3%) replied. Only four respondents were female. The average age was about 29.75. Most respondents were PhD students, besides those six professors also replied. Six respondents had a background in robotics (10.5%), nine in human-computer interaction (15.8%), 15 in pervasive computing (26.3%), 35 in wireless sensor networks (61.4%) and 12 in something else (21.1%) as anthropology, psychology, or security.

2nd Section - ICT-supported public participation in disasters

Question: Assume you got buried due to an earthquake. You are minor injured and capable of using your phone. What information would you like to receive (communicating over an emergency network facilitating a multi-hopping between Wi-Fi connected phones with one of them having connection to the existing infrastructure)?

Five respondents skipped this question. We were able to cluster the gathered data into seven groups:

- **Aftermath of disaster** as severity and immediate consequences—referencing to our scenario—as further shocks, collapsed building, outbreak of fire etc. (Seven respondents)
- **Status of beloved ones** including location and state of health. (11 respondents)
- **Receive updates** of response progress from agencies and local situation. (12 respondents)
- **Way finding** to shelter, collection points, food supply, hospital, or places to help other victims. (23 respondents)
- **Feedback** of registration victim and solidarity responses from local residents or friends and family members. (18 respondents)
- **Estimations** of probable time of rescue and safety of victim's location. (13 respondents)
- **Instructions** of proposed behavior (stay at one's place or leave), first aid procedures, or help for other victims. (Nine respondents)

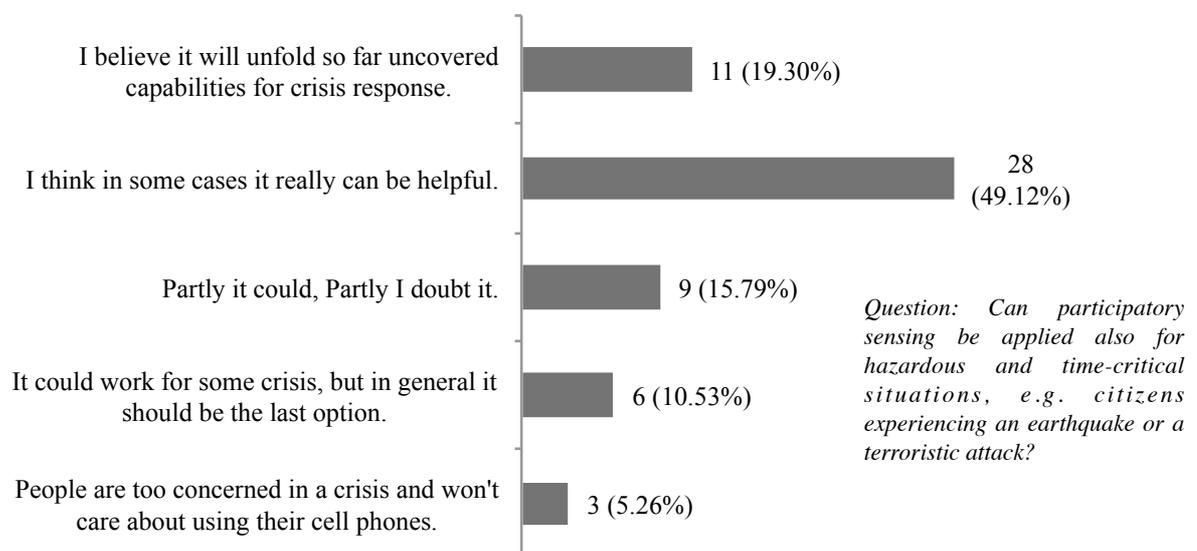


Figure 1. Perceived usefulness for disaster management

Question: Is it false viewing it from an ethical, legal or social perspective to involve citizens to support crisis response? (For instance, such involvement may include capturing images of injured persons.)

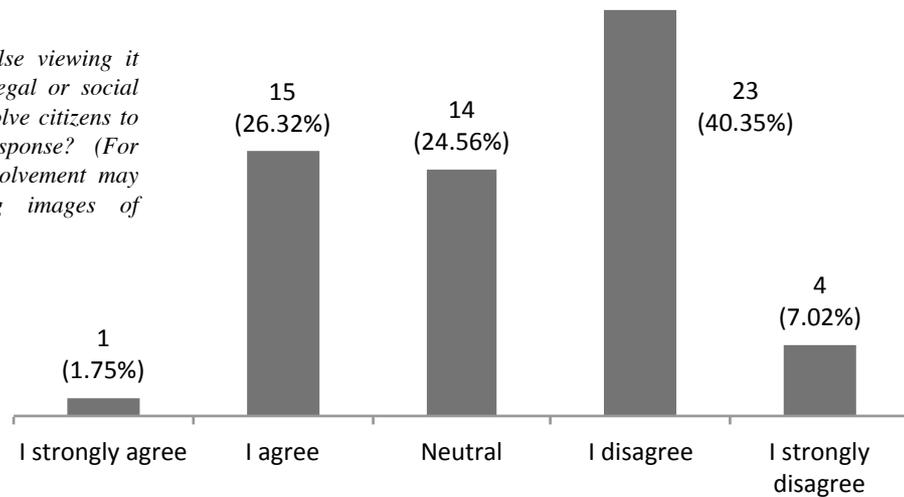


Figure 2. Ethical, legal or social concerns

Question: If you as a citizen contribute to crisis management using your mobile, how helpful would be the following services?

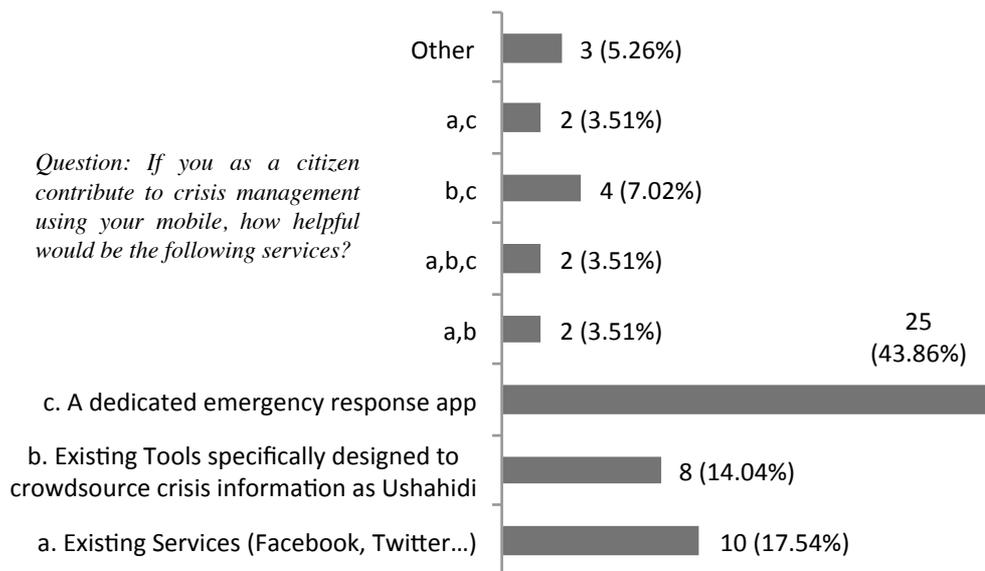


Figure 3. Type of implementation (existing solutions or dedicated)

3rd Section - Deployment

This section assumed the existence of a mobile emergency application enabling citizens in disasters to communicate with official response; via a local campaign the application is launched.

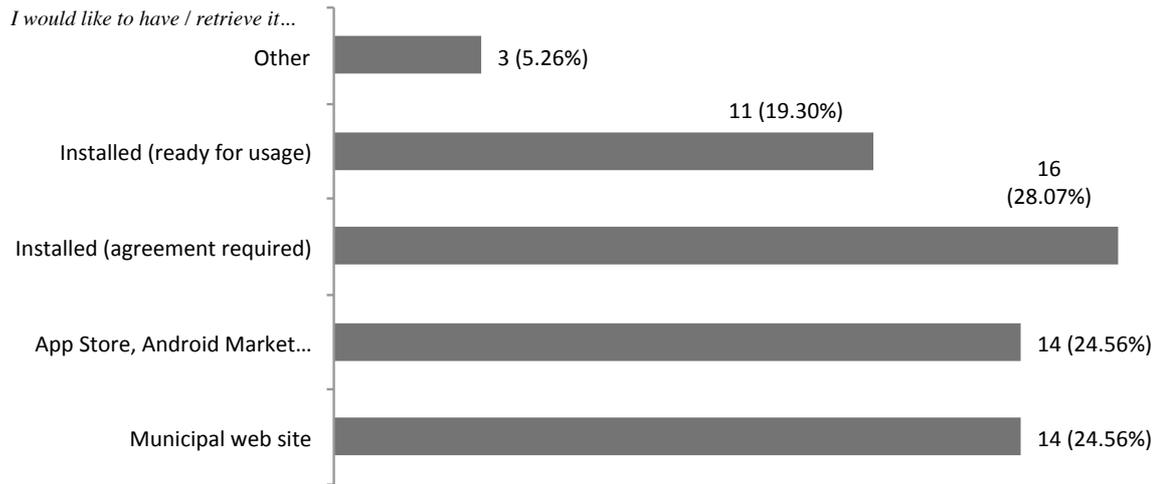


Figure 4. Deployment before disaster

Proposed additional ways of deployment were to use a browser-based approach abstracting from the OS, to receive a download link via SMS/MMS, or to have it available for installation in disaster, e.g. an emergency call could trigger a push notification installing it over-the-air; the latter desire relates to the next and last question.

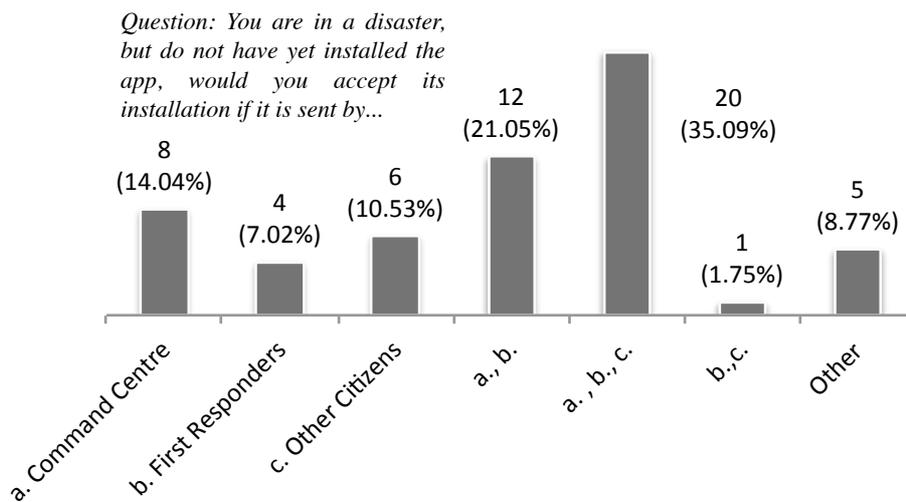


Figure 5. Dynamic deployment during disaster

Other elaborated options were to reject an over-the-air deployment and to have a trustful deploying party.

Other

25 respondents emphasized on a previous question or noted down something else, as for example: having no concerns to capture images as long as they do not show injured person and are only used for first aid; casualties do not have the same skills as professional and therefore hold the risk to make false alarms; authorities should follow social networks as Twitter and Facebook and start to integrate those channels or groups; combination of location-based social network services as foursquare³ with Twitter or Facebook and build an app on top of it; having no trust in Facebook; key challenge “Probably nobody will install such an app in advance, just in case it is needed.”; “it would be quite critical if the

³ Foursquare Official Web Site, <https://foursquare.com/>

authorities are able to install remotely applications on a phone, even by the use of a query dialogue”; time required for rescue may be higher than the phone’s battery lifetime.

DISCUSSION AND CONCLUSION

This study queried key user aspects when applying ICT to support public participation in disasters by asking 57 persons who are mainly PhD students with a technical background. The outcome of the study could significantly differ if conducted with a wider group. Nevertheless, the presented results help to better understand users’ needs and desire.

Our study assumes that communication works over an emergency network that mitigates infrastructural damage or overloaded being likely to occur in disasters (Dilmaghani and Rao 2008). On purpose we did not ask what information participants would send or share, as we thought this question is better to ask professional responders. However, if citizens would communicate over such envisaged network they anyway need to share data, i.e. by hindsight such question is relevant to be answered. To keep things simple we choose one basic scenario reflecting a disaster, though such approach holds the trade-off to skip asking for smaller emergency and larger crisis incidents.

Most answers show clear results, except in respect of the deployment. However, using another disaster scenario, e.g. something similar as the 2011 Vancouver riots, may have generated vastly different results. In particular, against the background that citizens in critical situations have already leveraged social network services successfully before we conducted this survey, we were quite surprised that so many respondents (43.86%) supported the implementation of a dedicated emergency application instead of building something on top of existing services as Twitter or Facebook. We argue that the assumption that a single application reflects simplicity might for our intent prove to be incorrect, and especially by hindsight lose its charm regarding the key challenge of deploying such an application. Hence, one question we can derive from the results of this survey is: *How can we design software that is useful in emergency incidents, and still charming enough to be used everyday?*

Furthermore, we did not expect that almost half of the respondents do not have any ethical, legal or social concerns when involving citizens in disaster management. As most respondents have never experienced a disaster such result is not representative. Therefore, in general the results of this study can only mark out what phenomena may emerge when applying ICT to support public participation in disasters. Hence, we like to continue our research into this direction to explore further insights, e.g. by organizing workshops with victims and first responders.

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