Chapter 29
Citizen-to-Citizen Resource Sharing in Emergency Response

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ABSTRACT

During large-scale manmade or natural disasters, such as Superstorm Sandy and Hurricanes Harvey and Irma, collaborations among government agencies, NGOs, and businesses need to be coordinated to provide necessary resources to respond to emergency events. However, resources from citizens themselves are underutilized, such as their equipment or expertise. The citizen participation via social media enhanced the situational awareness, but the response management is still mainly handled by the government or government-sanctioned partners. By harnessing the power of citizen crowdsourcing, government agencies can create enhanced disaster situation awareness and facilitate effective utilization of resources provided by citizen volunteers, resulting in more effective disaster responses. This chapter presents a public engagement in emergency response (PEER) framework that provides an online and mobile crowdsourcing platform for incident reporting and citizens' resource volunteering as well as an intelligent recommender system to match-make citizen resources with emergency tasks.

INTRODUCTION

Modern government has adopted the use of various technologies across its many facets of operation. In particular, emergency response stands out as a specific service provided by the government, paid for by taxpayer money that is ripe for innovation and optimization via a technological solution. The recent boom of social media services and their adoption by the public at large provide a unique opportunity to revisit the traditional problems involved in efficient and effective government emergency response and disaster management.

A frequent problem encountered during and after disasters is the lack of situational awareness of citizens' needs by government agencies. This makes it more difficult to effectively respond to the incident with appropriate resources. The communication between the responders and the victims is typically limited to one way – from the government to the citizens. The victims of the disaster are often left with few effective channels to access timely or comprehensive information regarding the assistance/cleanup/rescue services being rendered. This often fosters hard feelings between members of the government response teams attempting to do their best to manage the multitude of problems they face with limited time and resources, and the citizens who feel they deserve an immediate response, because they paid for these services with their taxes. For example, one of the most visible problems during the aftermath of superstorm Sandy (which afflicted the US East Coast in 2012) was a large response from the public (i.e., citizen volunteers) wanting to help clean up and to volunteer their time, equipment, and services to benefit Sandy victims, but were largely ignored by the government. This was due in part to the lack of a centralized way to allocate work efficiently and effectively – or to even identify areas where problems had occurred.

Some would consider such a situation a failure of the government agencies to serve its citizens, as they are chartered to be the marshals of resource planning and allocation during the response to a disaster – communicating with the public at large should be considered a top priority. Non-profits and volunteers also do themselves a disservice by not fostering a standardized method of communication amongst themselves and the official incident response teams. Squandering volunteer time or resources through poor communication of required tasks by the government and through the overloading of government employees by citizens obliging them to solve simple problems they themselves could handle with volunteer help are bad outcomes for everyone involved.

Thus, we propose a system named PEER – Public Engagement in Emergency Response to address the above-mentioned problems (Lorenzi, D., J. Vaidya, S. Chun, B. Shafiq, V. Naik, V. Atluri & N. Adam, 2013, 2015). The PEER system primarily focuses on leveraging the power of "crowdsourcing" – that is, using the citizens themselves as "sensors" in order to gather situational awareness data to aid in the recovery planning and allocation of resources during and after a disaster. PEER provides a framework for the government to allocate volunteers and their resources to solve problems in a more timely and local fashion. This is achieved through the use of social media as a platform to foster two-way communication and informational exchange between the government, citizen victims of the disaster and citizen volunteers.

We aim to create a design that implements a comprehensive, unified disaster management system focused around social media channels and smartphones for information dissemination. We use citizen-generated data using social networks to provide a means of citizen participation in disaster situation awareness and management. The government can utilize the social data for correctly pinpointing the disaster situation, hotspots for responses, and required resources. The citizens can also engage in "contributing" their skills and resources in the form of volunteerism to offset the resource scarcity of the

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