PEER:
A Framework for Public Engagement in Emergency Response

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ABSTRACT

While government agencies, NGOs, and even commercial entities immediately swing into action to help out, in the case of large disasters, one of the biggest resources – citizens themselves – are underutilized. The rise of social media creates an opportunity for the citizen participation for disaster response management. By harnessing the power of citizen crowdsourcing, the government can have enhanced disaster situation awareness and utilize resources provided by citizen volunteers, resulting in more effective disaster responses. In this paper, the prototype Public Engagement in Emergency Response (PEER) framework is presented. It provides a comprehensive online and mobile crowdsourcing platform for situation reporting and resource volunteering. Events are described that transpired in the aftermath of superstorm Sandy, which demonstrate the benefits of using the PEER framework in a major disaster situation. Also described is how it can alleviate some of the issues associated with the crowdsourcing responses such as fraud.

Keywords: Citizen Crowdsourcing Platform, Citizen Engagement, Citizen Resources, Citizen Volunteers, Disaster Management, Emergency Response, Social Media

INTRODUCTION

Modern governments have adopted various technologies across their many facets of operation. In particular, emergency response stands out as a specific service provided by the government from 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, provides 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 accurate situation awareness of citizens' needs by governments. This makes it more difficult to effectively respond to the incident with appropriate resources. The communication between the responders and the victims are 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 can often foster hard feelings between those in 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 are taxpayers.

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 volunteer their time, equipment, and services to benefit Sandy victims; but they were largely ignored by the government. This was due in part to the lack of a centralized way to allocate work efficiently or effectively – or to even identify areas where problems have occurred.

Some would consider such a situation a failure on the behalf of the government to serve its citizens, as they are chartered to be the marshal of resource planning and allocation during the response to the disaster - communicating with the public at large should be considered a top priority. Non-profit organizations and volunteers also do themselves a disservice by not fostering a standardized method of communication amongst themselves and the official incident response coordinators. Squandering volunteer time or resources through poor communication of required tasks by the government or the overworking of government employees by citizens forcing them to solve simple problems, they themselves can handle, is a bad outcome for everyone involved.

Thus, we propose a system named PEER – Public Engagement in Emergency Response

-- to address the above-mentioned problems. 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 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 and citizens/victims of the disaster/volunteers.

We have created a design for a comprehensive, unified disaster management system focused around social media channels and smartphones for information dissemination. We use citizen-generated data, through social networks, to provide a means for citizen participation in disaster situation awareness and management. The government can utilize the social data for correctly identifying the disaster situation, hotspots for response, 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 government. All of the data generated on the public social networks can be seen by everyone – aiding in transparency for both sides. Our approach can also be extended to include an incentive system that integrates with the technological system to achieve the desired outcome.

The rest of the paper is organized as follows: we first discuss existing published work that is related to our research, present the overall technological and policy framework, and develop the architecture of the proposed system. An overview of a real world prototype system that has been implemented is presented with many of the major functionalities. Subsequently, we look at potential applications of the PEER framework and consider the aftermath of superstorm Sandy to illustrate the benefits of using the framework to respond to a major natural disaster. We discuss some of the challenges and risks in deploying such a system, and

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