

LITERARY REVIEW

Determining Best Practices for Crowdsourced Information
in Disaster and Emergency Management

By

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Introduction

The adoption of digital media in the disaster and emergency management (DEM) field has presented an new paradigm in which mitigation, risk reduction, and response are highly influenced by a range of actors outside the traditional role of the emergency manager. Digital media not only allows for the distribution and storage of information, it also provides a platform for interactivity and arbitrary “group forming” networks (Smith, 2015). The latter allowances have fostered the new epoch of problem-solving that serve specific organizational goals by leveraging the collective intelligence of online communities, called “*crowdsourcing*” (Brabham, 2013).

Crowdsourcing has been extremely beneficial for the software development and business industries and the employment of the crowd has proved to be beneficial in much more altruistic ways. During the disaster crisis response in Haiti in 2011, the initiation of the Ushahidi crowd mapping platform (originally developed for crisis that followed Kenya’s presidential elections) allowed for the organization and allocation of resources to victims of the earthquake via social media. Today, the use of crowdsourcing in DEM remains in the context of response as the industry struggles to configure the manner in which it can be applied in a pre-disaster mitigation and risk reduction capacity.

Methodology

This study will examine how general crowdsourcing methodology can be applied to DEM practices. By evaluating and addressing the concerns of emergency management practitioners, the analysis contained in this study will provide an understanding of the way in which

crowdsourcing can be applied in pre-disaster situations. Through examination, this paper will suggest possible frameworks and best practices for crowdsourcing initiatives for the purpose of emergency managers leveraging crowdsourcing as a means to increase efficiency and expand resources.

The history of crowd behaviour spans over a century of empirical study. Over time however, the evaluation of earlier studies have been refuted nearly entirely. More recently, the collective intelligence of crowds was investigated in 2004 by James Surowiecki in his book *The Wisdom of Crowds*. Through the use of examples and comparisons of classic writings on the issue, Surowiecki's analysis of the crowd was counter to the findings of crowd behaviour from the past. The suggestion that the crowd was in fact prone to "group think" and therefore they did not responded independently, Surowiecki argued the opposite, that in fact the group was more intelligent as a whole then the smartest members within the group individually. Surowiecki's book serves as an foundation to the argument for collective intelligence. The use of collective intelligence in the digital sphere, specifically the internet, has allowed the crowd to interact in unprecedented ways, to solve important scientific and medical problems, build free software applications, and access to information.

This paper will be divided up into sections that will examine the history of crowdsourcing, typologies, disaster and emergency management in crowdsourcing, and rules of crowdsourcing.

History of Crowdsourcing

Recognized as an accidental economy by Jeff Howe, he coined the term “crowdsourcing” in a now widely cited article he published in Wired Magazine in 2006. Howe said “[crowdsourcing] is the new media: content created by amateurs. A little research revealed that amateurs were making unprecedented contributions to the science...the rise of online communities composed of like-minded enthusiasts...were at work.” In his 2008 book *Crowdsourcing: Why the Power of the Crowd Is Driving the Future of Business*, he advances his statement saying “if anything, I underestimated the speed with which crowdsourcing could come to shape our culture and economy, and the breadth of those effects.” (Ibid.). This paper intends to discover the means in which the DEM field can implement Howe’s revelations of crowdsourcing into an effective tool to aid in preparedness plans and pre-disaster risk reduction.

In 2013, Daren Brabham revisited his PhD dissertation in the form of a book simply titled *Crowdsourcing*. Brabham’s assimilation of empirical research on the subject gives the reader an overview of crowdsourcing and provides a direct and thorough investigation of collective intelligence, crowd wisdom, and distributed computing. He states that it was in the early 2000’s when the online participatory culture began thriving and organizations began to take advantage of the “collective intelligence of online line communities” (Brabham, 2013). Brabham’s book offers this study a comprehensive look at the attempts of multiple researchers to grasp a better understanding of crowdsourcing and the categories in which crowdsourcing comprises. In addition, Brabham offers crowdsourcing typologies he has derived from observation and analysis which can be used as a methodology from which a framework can be developed for various crowdsourcing initiatives.

Crowdsourcing Typology

In order to build a framework to utilize crowdsourcing, initiations must comprehend and apply the different levels of involvement of the crowd. Brabham's empirical investigation uncovered various typologies defining levels of involvement. These typologies address different aspects of crowd characteristics in engagement which lend well to development of a comprehensive framework that must be applied for specific outputs. Brabham's book offers a thorough breakdown of additional typologies such as the types of crowds, crowd abilities, types of individuals in the crowd and the functions of the crowd which can be adopted into a crowdsourcing framework. Jeff Howe proposed a typology that focuses on the manner in which various crowdsourcing application function:

- Crowd Wisdom
- Crowd Creation
- Crowd Voting
- Crowd Funding

Howe's typology simply categorizes the four ways in which crowdsourcing can be employed where as Brabham took the matter a step further. Different than Howe and the researchers before him, Brabham developed a typology based on the four types of problems in which crowdsourcing should or could be applied:

- Knowledge-discovery and management
- Broadcast-search approach
- Peer-vetted creative approach
- Distributed-human-intelligence tasking approach (money is a common motivator)

These typologies are instrumental in building the framework for emergency managers, and others, to implement crowdsourcing as a tool for problem-solving.

DEM and Crowdsourcing

The implementation of crowdsourcing in DEM currently exists within the capacity of response when coupled with social media. Meaning, that in most cases crowdsourcing is employed *by the crowd* in a disaster response in the form of crisis mapping. The information gathered from social media platforms such as Twitter have been successful in addressing the coordination of resources as well as identifying geographical locations affected by the disaster. However, utilizing the collective intelligence of the crowd has not been embraced by the emergency management community. The reasons for this have been addressed in a report written by Ryan Burns and Lea Shanley of the Commons Lab of the Science and Technology Innovation Program based out of The Woodrow Wilson Centre in Washington, DC. The report, *Connecting Grass-roots to Government for Disaster Management: A Policy Roundtable*, compiled the findings derived from a two-day workshop of the same name. The workshop consisted of 95 participants from various fields that impact the emergency management industry. The participants represented governments, universities, emergency response organizations, nongovernmental organizations (NGO's), private sector, and members of online communities. Commenting on the utilization of the crowd by emergency managers, Burns and Shanley state:

“The obstacles identified during this workshop were many and varied, including agency policies and institutional resistance; biases in the quality and distribution

of the data; uncertain legal contexts; and continuing concerns about the quality of collected data.” (p.3)

Burns and Shanley’s report will be the foundation of this study with respect to the concerns and conditions that surround the implementation of crowdsourcing in the DEM field. It is important to note that this report does not offer solutions to the concerns stated within it nor does it provide insight into the conditions that would make crowdsourcing an invaluable and effective tool for the DEM community. Determining these points is the purpose of this study and in doing so we will address issues such as accuracy of information, organizing the crowd, security and privacy concerns, quality of information and verification, and intellectual property.

Framework/Implementation

There are many different scenarios that one can utilize crowdsourcing. By considering Brabham’s typology of problem-based applications, we can begin to formulate a framework that can be implemented by emergency managers based on the problem that requires solving. In order to test out the framework, this study will work with an emergency measures office to determine what problems can be put to the crowd for solving.

In addition, the framework must consider the deployment and facilitation of the project to ensure the parameters are build to the satisfaction of the crowd and thus, success. By examining what parameters or rules need to be implemented and adhered to, this study will take a closer look at research that considers the incorporation of multiple managerial control systems as Sexton et.al. does in the article Rules of Crowdsourcing: Models, Issues, and Systems of Control. Taking into consideration that Saxton et.al’s. article is focused mainly on corporate adoption of

crowdsourcing, coupling this resource with Brabham's work offers this study a well balanced approach to constructing the appropriate frameworks and best practices for crowdsource implementation.

Conclusion

The empirical research referenced above will be the groundwork for the development of this study. There will be however, a number of supporting documents not mentioned in this review that will provide incite into more specific areas of crowdsourcing or crowd behaviour. It is important to note that in analyzing the research, behaviours indicative of crowdsourcing are described differently. For example, studies conducted within the computer science field describe crowdsourcing as human computation. These differences have led to a more lengthy investigation into the implementation and results of crowdsourcing, as it is the aim of this study to be as inclusive as possible to achieve its ultimate purpose of developing a framework and best practices for the DEM field.

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