

Exploring new ways of digital engagement: a study on how mobile mapping and applications can contribute to disaster preparedness

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Summary

Natural disasters can happen at any time and no community can consider itself completely safe from them. Digital technologies, such as Geographic Information Systems (GIS), are becoming globally pervasive (World Bank, 2014), with smartphones hosting excellent mobile mapping, data collection and information providing platforms. A report was compiled to investigate web and mobile applications that provide preparedness information and stimulate community empowerment, some using maps as a medium to convey the information. This body of work discusses the purpose, results and implications of this analysis for further work to be undertaken to address the identified research gap.

KEYWORDS: GIS, Hazards, Disaster Preparedness, Citizen Science, Web and Mobile Apps

1. Introduction

Disaster can happen at any time and no community can consider itself completely safe from the direct or indirect impact of natural disasters. Effective preparedness in communities has emerged in the literature as a crucial asset for limiting losses and ensuring rapid and sustainable recovery (Paton & Johnston, 2001; Paton, 2000). Nonetheless, a number of factors, spanning from emotional and socio-cultural foundations to the lack of information how to prepare, were found to be very influential on individuals' sense of agency in preparedness (Joffe et al., 2013; Paton et al., 2008; Morrissey and Reser, 2003; Duvaland Mulilism, 1999).

Digital technologies, particularly Geographic Information Systems (GIS), are becoming increasingly pervasive both in developed and developing countries (World Bank, 2014), with smartphones hosting excellent mobile mapping, data collection and information providing platforms. Scientists are debating the potential that the deployment of this new generation of social and web technologies could have in helping the general public to be better informed and actively involved in preparedness (Troy et al., 2008). Self-efficacy, community awareness, sense of agency, and resilience are the recurrent themes of this enquiry.

On the one hand, it is unquestionable that novel web and social technologies provide manifold channels of information about the occurrence, the intensity, and the area of impact of damaging event. The effectiveness of such technologies for preparedness is yet to be proven. Nonetheless, as some studies do support the idea that new web technologies and mobile applications facilitate learning (Corbeil & Valdes-Corbeil, 2007), a growing number of institutions are developing applications to communicate information on disaster preparedness through various web and mobile platforms.

Using geospatial technologies and extensive experience in citizen science activities, this paper discusses the work of the Challenging RISK team - an interdisciplinary group of researchers seeking to understand and improve how people prepare for fires and earthquakes. Part of the

project focuses on understanding how GIS and mobile technology can be used to break new ground in disaster communications, by providing actionable information to promote community engagement in disaster preparedness.

2. Web and Mobile Apps for Communicating Disaster Preparedness via GIS

A preliminary investigation was undertaken to examine potential strengths and weaknesses of currently active online and mobile-distributed applications that provide preparedness information and stimulate community empowerment. The investigation aimed at gauging information on the main distributors and on the intended users of preparedness information through web and mobile apps. These main distributors varied between Governmental and Non-Governmental organisations, as well as by jurisdiction (e.g. local, regional, or national). Interactivity and modality of outreach (e.g., newsletter, RSS feed, text alert, mobile maps) were also examined.

The investigation identified and analysed the contents of 97 active websites and 159 web and mobile apps, 82% of which are hosted on websites, Android, and Apple mobile apps. All the resources were intended for the general public and did not target a specific portion of the population. It was also found that there is a strong predominance of earthquake-focused resources (90%) with very few addressing fire (7%) and even less dedicated to both hazards (3%). Regrettably, very few of the analysed resources and apps allow for user interaction (12%; 4% websites and 8% web and mobile apps), leaving very little chance for two-way communication, the ability to contribute to content, or be involved in decision making processes – thus hindering instrumental or substantive empowerment.

Members of the general public tend to frame risk in a personal way (Dransch *et al.*, 2010), and the inclusion of mapping components in web or mobile applications may support the user in framing of the hazard risk from a personalised and location-specific perspective. Of the various apps, a number of them use maps to convey location specific information, such as where earthquakes have occurred within the last 24 hours, where local shelters may be, and the ability to contact emergency services and convey your location information based upon your current location. The displayed information can be extremely important for making life-saving decisions and maps provide an excellent medium for doing so.

Preliminary investigations are promising, but it is believed that shortcomings will need to be addressed in order to improve the effectiveness and likelihood of uptake of mobile mapping tools for community preparedness. People are more capable of contributing and improving their community when they are better prepared and willing to participate (Mäkinen, 2006). For web and mobile applications to encourage participation, digital divide and interactivity issues will have to be considered to facilitate holistic, two-way communication between people and organisations to enact change on a local level.

3. Conclusions and Further Work

This work investigated the various digital platforms that were available for conveying important, life-saving information on preparedness that utilise maps in innovative ways for doing so. From the study, it can be seen from the various sources that there are a variety of apps across platforms that focus largely on earthquakes, as opposed to fire, and that interactivity is lacking. Accessibility and interactivity should be considered for future tools to facilitate greater participation and a more holistic dialogue between people and the institutions delivering the applications. As part of the ongoing project work, the researchers will build off of the lessons learned from this report to implement geospatial technologies that empower people, communities and organisation to positively impact people's preparedness for disasters, through workshops to inform communities in Seattle and Turkey about how to use these applications to make a difference.

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5. Biography

Gretchen Fagg is an MPhil Candidate in the Extreme Citizen Science (ExCiteS) research group working on the Challenging RISK project working on community engagement and motivation. She has an extensive background in disaster and emergency management and seeks to apply those skills through implementation of digital technologies to empower individuals.

Patrick Rickles is a Research Associate in the Extreme Citizen Science (ExCiteS) research group working on the Challenging RISK project where he coordinates interdisciplinary efforts and develops required GIS technologies. His personal research is on how to effectively teach and increase uptake of GIS by researchers on interdisciplinary projects.

Enrica Verrucci is GIS researcher in Disaster Risk Reduction and Response. She combines a strong technical skill set in Environmental Engineering, Remote Sensing, and GIS with a deep interest for social studies. She currently holds the position of Research Associate in the EPICentre research group at University College London.

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