Chapter 15

Towards a Collaborative Disaster Management Service Framework Using Mobile and Web Applications:
A Survey and Future Scope

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ABSTRACT

Getting the right information at the right time and place is the key for efficient disaster management. Various mobile and web applications are now being used for collecting situational information in digital form, assessing damage, coordinating relief operations and offering different location based services to the affected communities during disaster management. This article provides a thorough investigation on popular web-based and mobile applications currently being used in different countries. Subsequently, the taxonomy of essential services needed for systematic and coordinated disaster management is formulated based on literature review and the authors' interaction with different stakeholders. An outline of a collaborative disaster management service framework is then proposed with the facility of interaction for the stakeholders through their mobile phones to avail the services in different phases of a disaster. A basic version of this framework is implemented to evaluate its effectiveness as a provider of significant actionable information to offer responsive services

1. INTRODUCTION

Responding to natural or man-made disasters, in a timely and effective manner, can reduce deaths and injuries as well as economic losses (Nouali et al., 2009). In this context, access to current geo-tagged situational information about the disaster-affected areas leads to efficient decision making and well-organized crisis response.

However, disaster management activities are not limited to post-disaster relief and rescue operations. While Prevention, Mitigation, and Preparedness are pre-disaster measures for avoiding the human and property losses by a potential hazard, on the other hand, Response, Recovery and Reconstruction are the post-disaster initiatives taken in response to a disaster with a purpose to achieve early recovery and rehabilitation of affected victims and communities (gktoday.in/blog/disaster-management-pre-disaster-and-post-disaster-phases).

ICT (Information and Communication Technology) based solutions may help in emergency preparedness such as first-aid assistance, early warning, navigational guidance to nearby shelters during pre-disaster and onset of a disaster. Four major areas are identified in during disaster and post-disaster scenario where ICT-enabled solutions may offer significant benefit (unescap.org, 2008), like i) Robust, interoperable and priority sensitive communication among field workers, volunteers and remote officials at Emergency Control Centers, ii) Better situational awareness, iii) Generating a common operating picture of resource and services needs as well as available resources and services in the disaster-hit area and iv) Improved decision support, resource tracking, and allocating system. Apart from these, some special services like an area-wise online list of victims may help in the reunification of missing persons with their families.

Nowadays, smartphones are being used for a wide range of activities including messaging, social networking, calendar, and contact management as well as location and context-aware applications. The ubiquity of handheld computing technology has been found to be especially useful in disaster management and relief operations as well as in mitigation, preparedness, and response phases (Shih et al., 2013).

Disaster management activities such as co-coordinating relief operations, setting up shelters, reporting structural damages, assessing the needs of the affected regions and overseeing volunteers generate a lot of data. These situational data may be collected from the affected regions and shared using smartphones carried by the volunteers, victims and other stakeholders participating in the disaster management process. Subsequently, the data provided by various organizations from different regions need to be consolidated in order to provide a comprehensive understanding of the entire situation and subsequently help the relevant authorities in effective decision making (Shih et al., 2013). A comprehensive situational view may be made available to all agencies involved in disaster management through interactive, map-based web interface so that subsequent course of action may be planned accordingly. Access to such integrated situational view, damage and need assessment reports through smartphones and laptops enable the volunteers and authorities to identify available resources vs. demands in the different areas, inaccessible and underserved areas etc. and to steer the resource distribution process accordingly. Thus, a collaborative and coordinated framework could be established using ICT-enabled solutions for effective disaster management in pre, during and post phases of a disaster.

CrisisWall (Groeve et al., 2013), developed by the Global Security and Crisis Management Unit (GlobeSec), is multi-device, multi-system crisis management software targeted to the principle emergency management tasks in a national or international crisis room namely, situation surveillance (overview of

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