Chapter 11
Utilizing Web 2.0 for Decision Support in Disaster Mitigation

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ABSTRACT

The principles of Web 2.0 such as transparency, security, community, usability, and availability are well suited to help effectively manage the effects of a disaster. Many Web 2.0 technologies rely on social collaboration, and as a result these technologies are built with robust communication channels. Utilizing this existing framework will help to create software systems that can efficiently manage disasters. This chapter will examine differing Web 2.0 innovations through the use of Activity Theory, and the benefits and drawbacks of each technology will be analyzed. From this analysis, recommendations and conclusions will be presented to the reader.

INTRODUCTION

The recent advances in computer systems have increased the ubiquity of Information Technology (IT), but it has not been fully utilized to solve some of the issues that affect our lives. Namely, the umbrella of Web 2.0 technologies has not been effectively employed to manage disasters. Web 2.0 can support disaster management because it efficiently manages large amounts of data and connects individuals through multiple networks for informed decision making. This chapter reviews a variety of Web 2.0 technologies and discusses their attributes and implications through the use...
of Activity Theory. The chapter, also, identifies the remaining challenges facing these technologies and proposes future improvements that may overcome these remaining challenges.

Natural disasters can have devastatingly broad reaching affects on a population and behave unpredictably. For example, in 2008 Hurricane Ike formed off the Gulf Coast, and it was predicted at first to make landfall off the Florida Keys. Instead, Ike moved on a different path after it passed over Haiti and Cuba, and as a result the weather models related to Hurricane Ike needed to be quickly revised (Berger, 2008). This scenario illustrates the need of having robust information systems in place during an emergency response for a natural disaster. Incorporating the features of Information Communication Technology to disaster mitigation would allow for a more constructive and productive response to a disaster. The basic principles of Information Technology such as transparency, reliability, accuracy, and timeliness are well suited to manage the affects of an emergency situation.

In this chapter, we examine Web 2.0 technologies and their potential roles in disaster mitigation. The chapter reviews several different Web 2.0 systems and discusses their attributes through the use of Activity Theory. The chapter is organized as follows. A description of the individual Web 2.0 technologies is first presented to the reader. This is followed by a discussion section. Background information is presented about Activity Theory in the discussion section, so that the reader is familiar with the context in which the differing Web 2.0 technologies will be evaluated. This section continues by discussing the specific Activity Theory principles used to evaluate the differing Web 2.0 technologies, and this is followed by an evaluation of these technologies though the use of the previously defined principles. Next, the remaining challenges are identified and discussed, and the chapter concludes with a recommendation section that outlines possible solutions to these challenges.

WEB 2.0 APPLICATIONS AND DISASTER MANAGEMENT

Social Tagging

Social tagging is a typical technology that is part of the Web 2.0 umbrella. This technology allows others individuals to associate keywords with any given topic. These keywords are used to categorize the different topics, and this user created index is used during keyword searches to aggregate similar topics as search results. All users have access to this information which in turn emphasizes the collaborative aspect of this Web 2.0 technology by shifting the responsibility of tagging new material from the content creator to content consumers. Allowing users to tag and sort different content can create more robust search results because multiple people are managing how the content is categorized.

Essentially users are creating a sizeable repository of highly specific metadata. For example, one user called for members of Flickr, an online photo sharing site, to tag all pictures related to Hurricane Katrina with a unique identifying keyword. Essentially, this user instructed other individuals to use the keywords “katrinamissing”, “katrinafound”, and “katrinaokay” to indicate the status of the individuals portrayed in the uploaded images. Similarly, after the collapse of the Minneapolis bridge in 2007, people were instructed by Flickr members to use the specific identifier of “mpls35W”. The selection of the keyword is only effective if non-generic terms are used. Generic keywords cause images to appear in unrelated searches, and these retrieved images maybe irrelevant to the search criteria. For example, during the California wildfires and admin asked the users in his group to use the tags of “SanDiego” and “fire” to categorize the uploaded images, but the selection of these keywords caused the images to be retrieved in unrelated searches. The key to
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