A Modular Collaborative Web-Based Framework for Humanitarian Crisis Management

Alessandro Annunziato, European Commission-Joint Research Centre, Institute for the Protection and Security of the Citizen, Italy

Brian Doherty, European Commission-Joint Research Centre, Institute for the Protection and Security of the Citizen, Italy

Hong Khanh Do, European Commission-Joint Research Centre, Institute for the Protection and Security of the Citizen, Italy

ABSTRACT

In humanitarian crisis situations, there is always more than one organization or agency involved in early warning, preparedness, and response to the crisis. These participating actors usually need a shared computer-based framework to exchange information, monitor the status of the crisis, communicate and coordinate operations among them in order to make their collaborations better, and make the right decisions at the right times. The aim of this paper is to present a web framework that has a modular architecture. This web framework has been realized by advanced web technologies and design patterns in software engineering. It is made up of diverse web modules and can be reusable and configurable to adapt with particular crisis contexts. The feasibility as well as the efficiency of this web framework is also demonstrated in the paper through real and complex crisis management scenarios.

Keywords: Collaborative, Emergency Information System, Emergency Management System, Health Information System, Humanitarian Crisis Management, Modular, Social Network

INTRODUCTION

According to Allen et al. (2008), there is no universal definition for humanitarian crisis. Each international humanitarian organization tends to have a definition based on its concrete domain. Generally, a humanitarian crisis can be understood as an event or situation that poses critical threats to the safety, security and integrity of human society. The cause of a humanitarian crisis can be armed conflicts or natural disasters (such as earthquakes, tsunamis, and pandemics).

Information and Communication Technologies (ICT) have a great potential to reduce negative impacts of humanitarian crisis on human life by firstly improving the communication of crisis information for governments and common citizens; and secondly providing opportunities for continuous monitoring of the
evolution of humanitarian threats. Turoff et al. (2010) give some data from a survey about the use of ICT in the 2007 Southern California wildfires, which had forced massive evacuations. The survey highlights the fact that a majority of respondents had access to informational web portals along with using other web tools (e.g., forums or photo-sharing sites or Twitter) to collect and share information on the wildfire crisis. While Turoff et al. (2010) mention the need for ICT during a crisis situation from the perspective of common citizens; Haddow et al. (2011) discuss the significance of software frameworks to help governmental and non-governmental organizations in assessing disaster impacts and coordinating crisis response operations. Haddow et al. (2011) emphasize the leading role of United Nations (UN) bodies and associated programs to coordinate with governments in the event of a disaster for rehabilitation and reconstruction. UN bodies have set up a number of web applications which support the communication of disaster information in the international humanitarian community and two of the most typical examples are ReliefWeb (http://www.reliefweb.int) – set up by OCHA (Office for the Coordination of Humanitarian Affairs) and HewsWeb (http://hewsweb.org) – set up by WFP (World Food Program).

Our research group in the Joint Research Center (JRC) of the European Commission (EC) has been involved in a number of crisis events in close collaboration with European Union agencies and UN organizations. To support the crisis management work, we have developed a modular collaborative web framework based on Dotnetnuke – an open-source content management system (CMS) (Dotnetnuke, 2011) with various functional web modules. The web modules are built by utilizing the latest web technologies and they cover a wide range: crisis document sharing, crisis information retrieval and aggregation, crisis map visualization, and collaborative social network.

This paper will discuss the use of this web framework to build complex collaborative web portals for several domains including emergency response, health threat monitoring and early warning. The paper proceeds as follows. Firstly, we review the literature on crisis/emergency management systems. Secondly, we introduce the conceptual architecture of the framework and technologies that have been applied. After that, we describe in detail some significant web modules. Then, we sketch out two real crisis management projects in which this framework has been applied. Finally, we draw some conclusions and highlight the future directions for the framework.

BACKGROUND AND RELATED WORKS

Humanitarian Crisis Management and Response

Managing humanitarian crisis, which is of either natural or man-made origin, always requires the support from various levels of government, and “a much broader host of organizations involving the private sector, nonprofits and volunteer organizations” (Murphy & Jennex, 2006). Jennex (2007) models crisis/emergency management and response in four phases: (1) situation analysis (SA) focuses on gathering data, monitoring and assessing a pre-emergency situation based on “a set of predetermined conditions” to provide analytical inputs for early action plans proposed to decision makers; (2) initial response (IR) takes place in a short duration and consists of confirming the emergency situation, sending warning notifications, and implementing initial actions; (3) emergency response (ER) focuses on collecting real-time information about the emergency situation, and coordinating all response activities; and (4) recovery response (RR) involves post – damage assessments, creating reconstruction plans, and capturing lessons learned. These four phases coincide with four in five emergency management disciplines presented in Haddow et al. (2011): SA coincides with Preparedness; IR coincides with Communication; ER coincides with Response; and RR coincides with Recovery. The fifth emergency management discipline in Haddow et al. (2011) is Mitigation.
Adaptive Ontology Use for Crisis Knowledge Representation
[www.igi-global.com/article/adaptive-ontology-use-crisis-knowledge/4010?camid=4v1a](www.igi-global.com/article/adaptive-ontology-use-crisis-knowledge/4010?camid=4v1a)

The Verification Pause: When Information Access Slows Reaction to Crisis Events
[www.igi-global.com/article/the-verification-pause/227724?camid=4v1a](www.igi-global.com/article/the-verification-pause/227724?camid=4v1a)