

Chapter 20

Information Seeking and Retrieval Service for Crisis Response

Nong Chen

Delft University of Technology, The Netherlands

Ajantha Dahanayake

Georgia College and State University, USA

ABSTRACT

Crisis response involves handling information intensive processes, and coordination of large quantities of information from and for different relief-response organizations. The information needs and responses of such organizations are closely related to the situations and roles these organizations are involved during a crisis relief-response process. The information seeking and retrieval processes associated with crisis situations influence the affectivity of response vigor and the coordination of relief-response activities. To provide an effective solution for a European Main Port's crisis response needs, a role-based situation-aware information seeking and retrieval conceptual framework is formulated. The conceptual framework, the design approach, and the implementation in a prototype are presented as an approach to design future crisis response for information seeking and retrieval services.

INTRODUCTION

Information acquisition in the event of a crisis in a harbor infrastructure is a very complex process. Timely and effective response to an incident in a port is extremely important because escalation to the level of a disaster can happen in minutes,

as in the case of a fire in an area where millions of liters of oil and other flammable or hazardous materials are stored (Barosha & Waling, 2005). Any delay in response time can increase the number of victims of a disaster, and a fast response can reduce or prevent subsequent economic losses and social disruption (Mehrotra, Butts et al, 2004). Effective response to a developing disaster requires

DOI: 10.4018/978-1-4666-4707-7.ch020

fast access to all the relevant information required to deal with the ongoing situation.

Depending on the scale of the disaster, crisis responses in a harbor infrastructure will range from dealing with a small-scale problem, in which a few organizations might be involved, to a full-scale crisis, in which multiple organizations are required to resolve and to prevent escalation of the crisis. Information relevant for a crisis response may be dispersed across heterogeneous, high volume, and distributed information resources. Such unpredictable crisis situations require the dynamic establishment of a “virtual team” consisting of the various relief-response organizations. In response to an ongoing dynamic crisis situation, membership of the “virtual team” can change accordingly depending on the type of crisis, its magnitude and how it develops. New relief-response organizations will join the “virtual team” when their services are needed, while others will leave when their response goals have been achieved. Distributed, dynamic and heterogeneous environments make it difficult for relief organizations to find and retrieve their specific organizational role and the crisis situation relevant information they require to inform their crisis relief activities.

Many harbors have built networked crisis response platforms to connect all crisis relief-response organizations, and to allow them to access, share and exchange information. One example of such a platform is called the dynamic map, which has been utilized and tested at some harbors, which allows relief-response organizations to oversee the disaster area and its surroundings, and to anticipate future developments regarding the crisis situation (Barosha & Waling, 2005). The dynamic map provides an efficient way of improving information acquisition in a distributed crisis environments, only serving to distribute uniform information to all the relief-response organizations involved in a crisis. It is difficult for an individual organization to select and retrieve information that is specifically relevant for its

role and its rescue activities, causing delays in information retrieval for its relief-response tasks. Such networked platforms are built based on the centralized design principle, which addresses inter-organizational information accesses over boundaries, is no longer the best principle to use when dealing with a dynamic crisis environment. The information needs of the relief-response organization can change dynamically, due to the unpredictable nature of a disaster throughout its course. The tasks and roles of the relief-response organizations will change, and therefore their information needs will change accordingly (Sorenen, Netten, et al, 2005). Some of these information needs will be short lived, and many of them will not be predictable, directly challenging the capabilities and flexibility of a centralized system design principle. The centralized design principle satisfies a user’s information needs by bundling information from heterogeneous databases. Therefore, it is not capable of satisfying dynamically changing information needs since it is not feasible to predefine all information retrieval applications to meet all the information needs for each possible crisis situation. The dynamically changing nature of crisis’s coupled with the diverse types of crisis’s that can occur, require a complete redesign of an application to meet the information needs for each possible crisis situation.

In summary, there is a need to develop a new crisis response information system based on a more flexible design principle, which is:

1. Capable of providing relief-response organizations with a role related picture of the crises development in a time critical manner.
2. Capable of satisfying changing information needs flexibly.
3. Capable of structuring advanced technologies and available technical infrastructures in a meaningful way to realize dynamic changing user information needs during a crisis response.

29 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:
www.igi-global.com/chapter/information-seeking-and-retrieval-service-for-crisis-response/90730

Related Content

Intersection of Disaster Resilience and Cultural Heritage Preservation: A Case Study of Flood Risk in Historic Savannah, Georgia

Erika Cross Carpenter and David J. Alexander (2022). *International Journal of Disaster Response and Emergency Management* (pp. 1-23).

www.irma-international.org/article/intersection-of-disaster-resilience-and-cultural-heritage-preservation/313025

Use Team Building to Make the Most of Your Public-Private Partnerships

Martin Negron (2015). *Emergency Management and Disaster Response Utilizing Public-Private Partnerships* (pp. 121-135).

www.irma-international.org/chapter/use-team-building-to-make-the-most-of-your-public-private-partnerships/124654

Review of Agent Based Modelling of Social Attachment in Crisis Situations

Julius M. Bañgate, Julie Dugdale, Elise Beck and Carole Adam (2019). *International Journal of Information Systems for Crisis Response and Management* (pp. 35-64).

www.irma-international.org/article/review-of-agent-based-modelling-of-social-attachment-in-crisis-situations/234326

An Efficient GIS Concept for Disaster Management in Developing Countries Based on Virtual Globes

Gunter Zeug, Dominik Brunner and Marco Scavazzon (2009). *International Journal of Information Systems for Crisis Response and Management* (pp. 15-32).

www.irma-international.org/article/efficient-gis-concept-disaster-management/37524

The Impact of War on Higher Education: The Context of Wars in Syria, Iraq, Ukraine, and Afghanistan

Mustafa Kayyali (2024). *Rebuilding Higher Education Systems Impacted by Crises: Navigating Traumatic Events, Disasters, and More* (pp. 275-284).

www.irma-international.org/chapter/the-impact-of-war-on-higher-education/343839