Chapter 3
Collaborative Systems for Decision Making for Disaster Preparedness and Response

Deirdre Hahn
Arizona State University, USA

Jessica Block
Arizona State University, USA

Mark Keith
Arizona State University, USA

Ajay Vinze
Arizona State University, USA

ABSTRACT

Real time collaboration solutions are critical during a large scale emergency situation and necessitate the coordination of multiple disparate groups. Collaborative technologies may be valuable in the planning and execution of disaster preparedness and response. Yet, research suggests that specific collaborative technologies, such as group decision support systems, are not often leveraged for decision-making during real time emergency situations in the United States. In this chapter, we propose a theoretical model of the impact of disaster immediacy and collaboration systems on group processes and outcomes. Using a 3D model of the dimensions of space, time, and situation, we explore media richness and group polarization within the context of collaboration technologies and disaster situations. We also present the next generation of collaboration technology extensions in order to address the need for more contemporary decisional settings. This set of principles and theories suggest how collaborative technologies may be positioned to better manage future disasters.

INTRODUCTION

Hurricane Katrina is considered the worst natural disaster in American history, affecting 92,000 square miles of land (Moynihan, 2007) and killing 1,464 people (LA Dept of Health and Hospitals, 2006). Katrina created a situation where federal, state, and local agencies had to collaborate in an unprecedented way. Despite extraordinary response
by both civilian and military relief organizations, the response aid to Hurricane Katrina was almost entirely a failure. No single individual or agency took charge in the beginning of the event, and the failure to establish a unified command among these organizations prohibited organized decision making and execution of relief activities. It was reported that the head of the American Red Cross was refused access to the Superdome at the height of the crisis, and that trucks with supplies donated by Walmart were turned back by security forces and local boat owners were prevented from delivering aid supplies (Mindtel, 2005).

According to government reports, the greatest failure in the emergency response to Hurricane Katrina was an astonishing lack of communication and coordination between military and local law enforcement, with civilian organizations (Moynihan, 2007). Demand for resources and services surge during a crisis, often before decision makers make the needful allocations. Decision-makers must prioritize issues in real time across multiple variables such as cost, impact, and ease of recovery while ensuring that a base level consensus is maintained. The stark reality, learned after the fact, was that the ability of the responding agencies to deal with uncertain information in a straightforward way and reach consensus hinged on the quality of collaboration of groups prior to the emergency. In other words, the efforts of emergency responders and aid organizations to practice group collaboration before the emergency may have created higher levels of situational awareness and, thus, more rational responses during Katrina.

Practicing complex collaboration scenarios through table top exercises or simulations prior to an emergency situation is now standard group work for most emergency aid organizations. What is not standard is an understanding of the role that collaborative systems and technology play for group settings in disaster preparedness. As exemplified during Hurricane Katrina, coordination of disparate organizations during planning and execution can be extremely complex, and as such, it is important to examine if collaborative systems could aid in the coordination of these groups. Leveraging collaboration systems and decision support technology enhancements could change planning for disaster preparedness as well as emergency response coordination from both a theoretical and practical perspective.

Decision Support Systems

Decision support systems (DSS) and interactive computer based information and knowledge systems, have been around for over the last 30 years to support business and organizational decision making. DSS tools allow users to make real-time decisions by organizing raw data, managing information, controlling inventory, and running models. A specialized extension of DSS, group support systems (GSS), was developed as a solution to specifically improve group decision making processes. GSS applications started to become commercialized in the late 80’s and early 90’s, using computer technologies specially designed to facilitate group decision making, minimize negative group dynamics and enhance positive influences of individual input within a group. Commercial examples of a GSS application include GroupSystems™, Facilitate.com, and Zing Technologies. Significant research supports the multiple collaborative benefits of computer-based GSS tools for more effective meetings and coordination of group efforts (DeSanctis & Gallupe, 1987; El-Shinnawy & Vinze, 1998; Isenberg, 1986; Nunamaker, Dennis, Valacich, Vogel, & George, 1991; Rains, 2005).

Multiple terms have been used to describe the set of technologies which facilitate group collaboration and decision making: Decision Support Systems (DSS), Group Support Systems (GSS), group decision support systems (GDSS), computer-supported collaborative work (CSCW), collaboration technology (CT). Typically, the use of CT is considered or analyzed in terms
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