Chapter 23
Exploring Socio-Technical Design of Crisis Management Information Systems

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ABSTRACT

In this chapter, we explore design foundations and conceptualize a design approach to examine the socio-technical knowledge that crisis organizations have about crisis management Information Systems. We use findings from a case study across four crisis organizations to illustrate how the network of knowledge, information management, and integration of technology and information were interpreted by stakeholders during a large wild fire in 2006. The design approach illustrates that design foundations of crisis management Information Systems encompass: a network of knowledge, IT management, and information integration. We argue that the design foundation is promising for analysis and explanation of the enrolment of actors, adaptation of technology/processes, and stabilization of crisis management Information Systems.

INTRODUCTION

The purpose of this paper is to illustrate that crisis management information systems need to be further conceptualized due to the complex mixture of socio-technical relationships that constitute crisis management. While mainstream design approaches to crisis management information systems concentrate on formal systems requirements (Murhen et al., 2008), the socio-technical reality of crisis management information systems has not been well researched (Comfort, 2005). For example, Turoff et al. (2004) focus on the software requirements for those planning and executing the emergency response management function. Indeed, information and communication technology is a necessity during crisis for actors at all levels, from first responders to second command

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line decision makers (Jennex, 2005). However, the extended information dependent crisis actor network, grounded in the hierarchy structure of crisis organizations, demands other plausible design premises than that of traditional decision science. The foremost reason is that crises are complex socio-technical environments to manage and control because they concretize discontinuity as the rule, and continuity as the exception, and crisis information systems has primary been designed according to the exception (Murhen et al., 2008).

We argue in this paper that this kind of socio-technical context needs further emphasis and clarification regarding information technology in use to understand crisis management information systems. Inspired and influenced by the socio-cognitive arguments for technological frames put forth by Orlikowski and Gash, (1994) we assemble the following three dimensions as promising ground for crisis management IS design:

- The infological dimension of information technology, which suggests that human actors can utilize IT to create and maintain knowledge in a human activity system, i.e., a network of knowledge.
- The management of information technology. This means that crisis organizations need to carefully determine, plan and evaluate alternatives of IT.
- The operational use of information technology. How information is shared between actors and why information integration is critical for successful emergency operations.

Based on the these three dimensions, we conceptualize a design approach for crisis management information systems using Actor Network Theory to illustrate its applicability in the networked environment of crisis management.

The chapter is structured as follows, after the introduction the seminal literature of information systems in the area of crisis management is reviewed. Next, the background to the study and methodological considerations are discussed Then follow a section in which networks of knowledge are discussed as one fundamental premise for crisis management information systems. Next, two central aspects of information management are presented that are deemed important for the understanding of technology in processes. Section six contains a discussion of the importance of integrating the flow of information in a networked crisis environment. Section seven synthesizes the above into a design approach for crisis management information systems. Finally, the conclusions from the study are presented together with suggestion for further work.

RELATED LITERATURE

The recognition of IT support during crisis management is not a new object to crisis management organizations (Comfort, 2005). In fact, there is a wide consensus in the literature that information systems are essential for crisis management (Jefferson, 2006; McDonald & Sinha, 2008; Murhen et al., 2008; Nunamaker et al., 1989; Turoff, 2002). Crisis management information systems comprise of a human activity systems that use technology to achieve defined goals, and thus need to be evaluated in the context they function in. As noted by Orlikowski & Gash (1994),

technologies are social artefacts, their material form and function will embody their sponsors' and developers' objectives, values, interests, and knowledge of that technology (p. 179).

To this end, Orlikowski and Gash (1994) stress the importance of local understanding of IT uses in a given setting, and found that the 'nature of technology,' 'technology strategy' and 'technology in use' are domains that characterize interpretations of a certain technology. Nature of technology refers