

Dynamic Communication Networks During Extreme Events: an Intertemporal Analysis of Radio Communication During the World Trade Center Disaster *

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ABSTRACT

It is well-known that actions taken by first responders within the early hours of an emerging disaster can have a substantial impact on the magnitude of eventual losses to life and property. Such activities are heavily dependent upon effective communication among responders; relatively little is known, however, regarding the detailed structure of communication during the immediate post-impact period. This talk presents an intertemporal analysis of radio communications among first responders to the 2001 World Trade Center disaster, based on data obtained from the Port Authority of New York and New Jersey. Substantial inequality in the extent of communication system usage is demonstrated, with a disproportionate amount of activity accruing to a relatively small number of individuals. Detailed modeling of network dynamics using a family of inhomogeneous Poisson processes is employed to evaluate a number of potential explanations for the emergence of coordinative roles during the WTC response process; realized communication patterns suggest the interaction of multiple structural influences. Implications for behavior in crisis settings, and for modeling of event-based communication systems, are discussed.

Keywords

disasters, network dynamics, hazard models, communication networks

*This work was supported in part by NSF awards IIS-0331707 and CHE-0555125.

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NetSci2006, May 22–25, 2006, Bloomington, IN, USA.