

SYSTEM-LEVEL INVESTIGATION OF COGNITIVE ADAPTATION IN INCIDENT MANAGEMENT

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Abstract

My dissertation research to date has focused on understanding how incident management teams (IMTs), hastily formed multidisciplinary multiteam systems, cognitively function together as adaptive, joint cognitive systems-of-systems embedded in complex sociotechnical systems. Catastrophic disasters such as Hurricane Harvey highlight the importance of collective efforts for adaptive incident management. Team cognition has emerged as a coordinating mechanism in safety-critical disciplines; however, little is known about cognition in IMTs.

Through a scoping review of existing definitions, I proposed an expanded definition that deliberately takes into account IMT's unique contextual characteristics, based on three premises: cognition in IMTs (1) manifests as interactions among humans, teams, and technologies at multiple levels of multiteam systems, (2) aims to achieve the system-level cognitive goals of perceiving (P), diagnosing, (D), and adapting (A) to information, and (3) serves as an open communication platform for adaptive coordination.

Then, I operationalized our proposed definition in a simulated environment as an initial attempt to model IMTs' system-level cognition. Based on several observations of IMTs' naturalistic interactive behaviors under different types of disaster scenarios, I proposed a model that can capture how IMTs as joint cognitive systems (or systems-of-systems) perceive (P), diagnose, (D), and adapt (A) to information, i.e., perceive, diagnose, adapt (P, D, A) model.

With an emphasis on system-level cognitive goals that applies to multiple units of analysis (e.g., individuals, dyads, teams, and multiteam systems), I could gain an understanding of system-level cognitive adaptation in incident management. Using the P, D, A model as a base platform, I expect to discuss resilience as cognitive adaptation processes along with its implications on human information processing and joint cognitive systems theories.

I became a Ph.D. candidate after successfully proposing my dissertation research in last June. After completing data collection and processing, I am currently working on data analysis and manuscript preparation. As a part of NSF-funded project (NSF EARly-concept Grant for Exploratory Research, #1724676), I believe my dissertation work has a potential to practically impact scenario-based training practices of incident management, and thereby lead to a more rapid and better coordinated decision-making in saving lives and infrastructures.