Group Information-seeking Behavior in Emergency Response: An Exploratory Study

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Extended Abstract

Emergencies—whether natural or technological, random or human-induced—may bring profound changes to organizations, the built environment and society at large. These changes create the need for reliable information about the emergency and its impacts, and thus require responding organizations to seek and process information from an evolving range of sources. By understanding how skilled versus novice response personnel search for information in emergencies, we may begin to understand how to support and train for skillful information seeking in situations characterized by risk, time constraint and complexity. This study develops a hypothesized model of information-seeking behavior in emergency response and evaluates it using data from expert and novice groups addressing simulated emergency situations. Revisions and future refinements of the proposed model are presented based on the analysis of information seeking behavior from the experiment. The paper concludes with a discussion of implications for the design of information systems to support efficient information-seeking and decision making under risky and time-constrained situations.

Information seeking may be characterized by its extent (i.e., how exhaustive is it) and nature (i.e., what is searched for). Prior research suggests that the information-seeking process consists of multiple stages and is influenced by various factors. Under time pressure, decision makers may speed up their information processing and be more selective in choosing which information to process. In emergency situations task complexity can be regarded as a function of time, risk, available resources and changing goals. Increases in task compelxity lead to increases in information load and the rate of search. Differences between experts and novices may be manifested in several ways. For example, experts may be more efficient than novices in information filtering (i.e., seperating relevant from irrelevant informaiton) and in utilizing known facts.

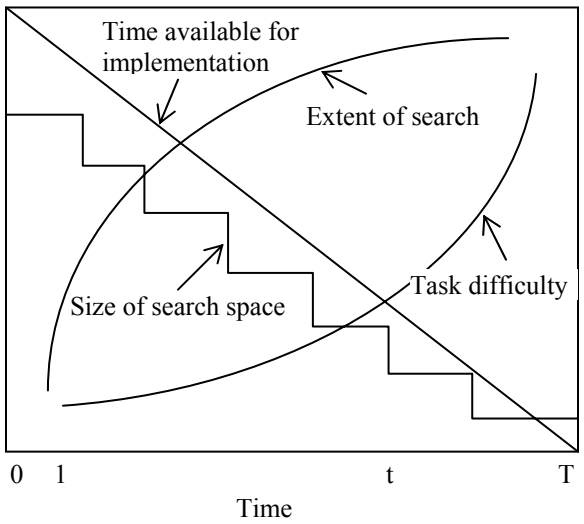

Figure 1. Model of Information-seeking behavior

As depicted in Figure 1, when decision makers at some time *t* are faced with a future deadline at some future time *T*, every minute spent on planning is one less minute available for plan *implementation*. Simultaneously, material and personnel resources available for responding to the event decrease, which increases risk as appropriate resources go out of range. On the other hand, the reduction in the *size of the search space* (i.e., the set of feasible plans involving these resources) means that a larger *extent* of it can be searched over time. The passage of time therefore leads to increasing complexity and risk, forcing response personnel to "make do" with diminishing resources. *Task difficulty* is inversely related to the number of available resources and the number of potential solutions. The hypotheses that follow from this discussion are as follows:

H1.1: As time to implement decreases, extent of search increases. *H1.2*: The search extent of novice groups will be greater than that of expert groups. *H2.1*: As time to implement decreases, less information will be sought. *H2.2*: As time to implement decreases, search for information that is common to all members of the group increases. *H2.3*: As time to implement decreases, search for information that is unique to individuals in the group decreases. *H2.4*: As time to implement decreases, expert groups' search patterns will change less than novice groups'.

The data were drawn from a series of studies on group decision making in simulated emergency response scenarios. Both novice and experienced groups of participants convened to work on two separate simulated emergency incidents (here denoted "cases"). Each group member took on one of five roles: Coordinator (CO), Police Department (PD), Fire Department (FD), Medical Officer (MO), and Chemical Advisor (CA). Their task was

to allocate resources from various sites to meet the given goals for the response. Each non-CO role could view unique information (i.e., information about resources at the sites belonging to that role, but not information about sites belonging to other roles). Alternative resources (AR) were also available at various sites, and information about them was common (i.e., it could be accessed by all roles). The CO had accessibility to information about all sites.

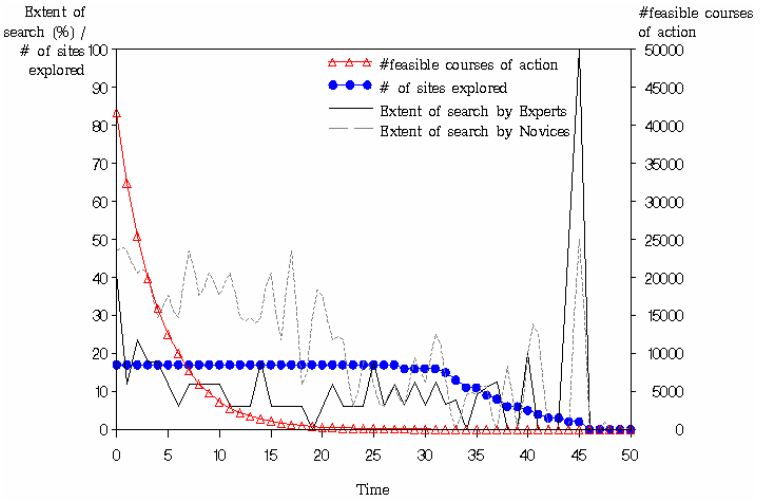

Figure 2. Revised model on extent of search

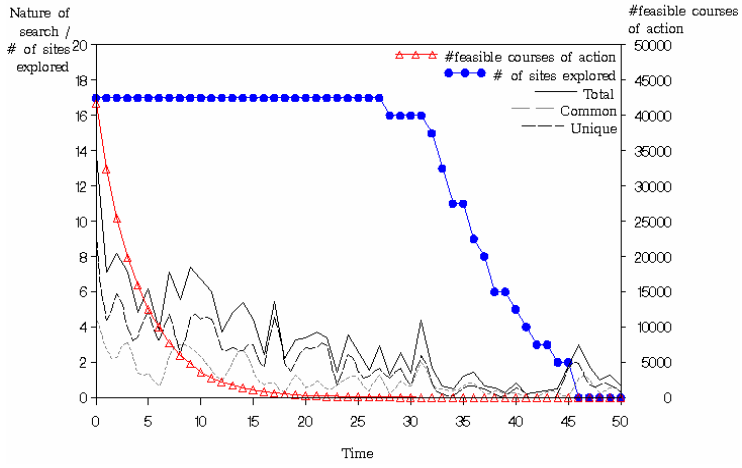

Figure 3. Revised model on nature of search

The studies involved 7 groups from U.S. Federal Emergency Management Agency's National Fire Academy and 4 groups from undergraduate engineering and business programs at a medium-sized northeastern university. Results of the study are summarized in Figures 2 and 3, which represent refinements to the hypothesized model shown in Figure 1. The variable "#feasible courses of action" is inversely related to task complexity. The variable "# of sites explored" depicts the size of the search space over time. As shown in Figure 2, novice groups search a greater extent of the space than expert groups, the only exception being during the last several minutes, when novice groups abandonded search while expert groups continued search (though there were only one or two sites available during this time. Regarding nature of search (Figure 3), both expert and novice groups' search for common and unique information decreases over time. In conclusion, the extent of search decreases over time and H1.1 is not supported. However, the search extent of novice groups is greater than that of expert groups and H1.2 is supported. As time to implement decreases, search for common and unique information decreases, supporting H2.1 and H2.3 but not H2.2. Expert groups are more consistent in search than novice groups, thus supporting H2.4.

The results suggest that time constraint impacts patterns of information-seeking both for expert and novice groups. Search for common and unique information decreased over time under time pressure. In an actual emergency situation, information (even about available resources) may change over time, so that the cost of finding reliable information may become too high. The results provide some practical implications for the design of information systems to support decision making under risky and time constrained conditions. One implication is that informaiton filtering provided by the decision support systems will be more valuable for novices than for experts. A second suggestion concerns the effort groups devote to seeking unique and common information. Novice groups may spend more effort locating both unique and common information than expert groups. So under the condition in which unique information is critical for decision making with time constraint, decision support systems may be of great value for decision makers in targeting search.

Future work in this area includes analysis of the conversations that took place between decision makers in order to consolidate the proposed model.