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Sharing your view: A distributed user interface approach for reviewing emergency plans

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ABSTRACT

Emergency planning is an ongoing activity in which a multidisciplinary group of experts intermittently collaborate to define the most appropriate response to risks. One of the most important tasks of emergency planning is the review of plans as a way of maintaining, refining, and improving them. This review of plans is based on exchanging knowledge and experiences in order to take into account different perspectives and generate alternative solutions. An exploratory case study carried out within municipal organizations has disclosed how the application of rigid plan reviewing practices hinders team creativity and, consequently, effective decision-making. This paper presents a computer-based collaborative environment aimed at supporting unstructured team discussion during the post-hoc review of emergency plan. This collaborative environment allows emergency planning team members to share their view in a free manner by interacting with user interface components distributed across several input and output dimensions. The usage of the environment has proved how the application of new interactive technologies can create more dynamic work settings, fostering team creativity.

1. Introduction

Emergency management is commonly defined as "the managerial function charged with creating a framework within which communities reduce vulnerability to hazards and cope with disasters" (FEMA, 2007: page 4). Such a framework should encompass the capability to reduce the effect of, prepare for, respond to, and recover from emergencies and disasters. Hence, from a procedural point of view, emergency management represents the process of mitigation, planning, response, and recovery that occurs around a variety of potentially catastrophic events (Dynes, 1994; Haddow and Bullock, 2003). Effective emergency management is rather a strategic task than a tactical effort, whose performance relies on the coordination and integration of all the activities necessary to ensure the continuance of the community within their planned lifetime (Haddow and Bullock, 2003). This strategic task is essentially achieved by the elaboration of emergency plans at all levels of the community.

Emergency planning may be described as an ongoing activity in which a multidisciplinary team of experts collaborates to be prepared for emergencies and disasters (Perry and Lindell, 2003). The primary focus on the emergency planning activity should be the development of mechanisms and techniques of coordination that allow an effective response on the part of the organizational resources in the community (Dynes, 1994). This effective response largely relies on the continuous review and improvement of the plan as a way of assuring its validity (Kartez and Lindell, 1989). Throughout the definition of a plan, planning team members can identify new risks that were not considered in earlier phases or that have arisen after the definition of new protocols; similarly, after training and drilling activities, planning team members should examine actions in order to identify possible mistakes or underconsidered aspects. Planning does not actually finish with the implementation of the plan and the analysis of its results, but it is an ongoing activity that should reflect such changes in the environment, the resources, as well as the target community. Thus, the review of emergency plans is performed in three basic situations: after the implementation of the plan—post-hoc review, at predefined intervals—periodical review, and after the occurrence of changes that will invalidate any part of the existing emergency plans—updating review. Within these situations, the post-hoc review of plans is a specially challenging task that requires not only exchanging knowledge and experiences about the plan, but also confronting reviews and exploring alternatives.

The post-hoc review of emergency plans is often carried out in face-to-face meetings, in which the assessment and update of the plan are conducted by formal structured discussions (Erickson, 1999). As an exploratory case study in small emergency organizations has shown to us, this way of performing hampers the

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decision-making process, reducing the exchange of ideas, the elaboration of alternatives, and the emergence of new viewpoints; in summary, the occurrence of creative thinking. The effect of this phenomenon is a post-hoc review process in which main mistakes and deficiencies in the response are well identified, but in which new planning solutions are not properly considered.

This paper presents SharedViews, a computer-based collaborative environment aimed to support collocated team brainstorming session during the post-hoc review of emergency plans. Post-hoc review should be devoted to the collection of information about the incident, the response performance, and the emergency plan itself, as well as to the identification of failures, nonconformities, and improvement points in a collaborative way. Against the idea of a structured review process grounded on following a particular set of predefined steps, our computer-based collaborative environment supports free flows of information and spontaneous involvement to enhance creativity. In order to prove the technical feasibility of our approach as well as the quality of this kind of solution, a proof of concept based on the notion of distributed user interfaces was developed. Thanks to our solution, planners can exchange their knowledge and experiences in a free manner by using interactive components distributed across several input and output dimensions.

The rest of the paper is organized as follows. Next section focuses on stressing emergency planning as a creative team decision-making process. Section 3 reviews works devoted to support collocated computer-mediated discussion. These works might be used as a reference to scope and define our solution. The description of the exploratory case study that established the motivation of our work is presented in Section 4. Section 5 describes the main features of our solution, paying particular attention to the design goals and the system requirements that drove its development. Section 6 demonstrates the feasibility of our solution to support spontaneous collaboration during the post-hoc review of emergency plans. The evaluation was based on different analytical and experimental methods. Finally, the discussion about the solution and recommendations for future work are drawn in the last section.

2. Background

The reason to be of emergency planning is the protection of the society, its properties and infrastructures, and the environment during an emergency situation. Specifically, emergency planning may be defined as:

Definition. The development, refinement, and maintenance of a predefined set of procedures oriented to prevent, reduce, and cope with critical incidents and emergency situations.

Emergency planning can be regarded as the systematic process of collectively thinking about and establishing all the activities required to face with different incidents, crisis, and disasters. This process of thinking mainly relies on integrating knowledge from different experts in order to make novel decisions. The following subsections review the concept of emergency planning as a team decision-making process, in which success depends on both the support of information pooling and the occurrence of creativity.

2.1. Emergency planning as a team decision-making process

Though "there is a tendency on the part of officials to see disaster planning as a product, not a process" (Wenger et al., 1980: page 134), emergency planning is more than the definition of written documentation. Planning is an intellectual process which is concerned with deciding in advance what, when, why, how, and who shall do the work, while the plan itself represents a snapshot of that process at a specific point in time (Perry and Lindell, 2003). Consequently, emergency planning may be conceived and implemented as an ongoing process.

As activity dealing with natural hazards and human-made disasters, emergency planning is driven by two main objectives: risk assessment and risk reduction (Perry and Lindell, 2003). First, risk assessment involves not only stocktaking all the threats that have previously affected the community in a similar event or situation but also estimating new or potential threats. Second, risk reduction involves an examination of the actions required to decrease the detected or projected levels of danger and to identify the resources required for implementing those actions (Perry and Lindell, 2003). Being prepared requires therefore the definition of a series of actions conducted in a certain manner during the emergency as a way of facing with and resolving it. In this way, emergency response should be regarded as a problem-solving activity and emergency planning as a decision-making process.

Finally, as far as the composition of the emergency planning team is concerned, emergency planning has been viewed as a forecasting activity accomplished by experts from different disciplines (Dynes, 1994). Emergency planning may be regarded as a decision-making process carried out by multidisciplinary teams.

2.2. Information pooling and creativity in decision-making

Team (group) decision-making refers to any decision situation in which there is more than one individual involved. The effectiveness of group decision-making is based on the idea that group can develop better solutions because their collective knowledge is greater than that of a single person (Butterfield, 2009). Leaving aside psychological, social, and organizational factors related to teamwork, an essential aspect of decision-making process is the need of pooling information as a manner of making appropriate decisions (Brodbeck et al., 2007). The need of pooling information from different expert background is especially significant in the emergency planning activity. Emergency planning involves collecting knowledge and experiences, disseminating information about the management of potential risks, and providing and allocating facility resources and personnel to successfully deal with identified hazards (Haddow and Bullock, 2003). Emergency planning team needs to exchange information related to a specific emergency, as well as to discuss about the risks and the resources required to be prepared for emergencies and disasters (Perry and Lindell, 2003). Emergency planning is therefore grounded on pooling information about incidents, the response performance, and the implementation of the plan itself.

As far as the way of performing decision-making is concerned, it is often made the mistake of thinking that decision-making is just an analytical process. Faced with a decision situation, the task is to think through the options and choose the one that meets the best with the objectives. This view, though, is incomplete and denies the creative side of decision-making (Meredith, 2006). An active decision maker will search for decision opportunities and try to create them whenever possible. Focusing on emergency planning, as an activity oriented to face with unexpected situations, in spite of being driven by standards, it should be carried out to build and expand relationships that help bring new response alternatives. Effective emergency planning must be conducted to explore and make novel connections between knowledge and experiences from emergency planners that lead to creative solutions.

3. Related works

Brainstorming is commonly known as a key technique for divergent thinking (Osborn, 1953). Brainstorming can be individual, although the term more often refers to a group process for