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A Framework for Knowledge-Based Crisis Management in the Hospitality and Tourism Industry

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Crisis management, disaster recovery, and organizational continuity are critical areas of competence for managers of individual businesses and entire destinations. For large-scale problems, crisis management may be a critical factor that determines the sustainability and success of a destination. In this article, the authors develop a framework that incorporates knowledge management principles to enhance the effectiveness of crisis management and planning for the hospitality and tourism industry. In addition, the authors develop a crisis typology based on the perceptions and knowledge needs of Philadelphia-area lodging operators. Subsequently, the authors apply the framework to envision the design concept of a knowledge-enabled crisis management system that can better support the crisis management and preparedness of a regional hospitality and tourism industry.

Keywords: crisis management; crisis typology; hospitality and tourism industry; knowledge-based system (KBS); knowledge management (KM)

Natural disasters, industrial accidents, and other crises can disrupt an organization's functioning and survival (Caponigro 2000). This is particularly true of the hospitality and tourism

industry, which is often a prominent victim in crises (Faulkner 2001). A major crisis can instantly damage a destination's reputation and infrastructure, both of which may take years to rebuild. The horrific November 2008 terrorist attack in Mumbai and the hurricane disaster in New Orleans are some of the glaring examples. Sometimes, even seemingly small accidents such as a slip-and-fall injury in a hotel lobby can lead to unwarranted financial liabilities. Therefore, an organization's crisis management capabilities should be of such quality that an evolving crisis can be resolved quickly and prevented from spreading to the extent possible. As crises grow in complexity, their management requires an intricate and coherent combination of natural and human systems (Richardson 1994). Such an increase in complexity requires greater levels of focus, resources, coordination, and managerial accountability.

We have seen considerable academic- and practitioner-oriented research related to crisis management actions and strategies relevant to the hospitality and tourism industry. While some researchers have developed generic strategies meant to apply to any crisis situation (Faulkner 2001; Ritchie 2004), others have analyzed the effects of specific crises in the tourism industry (Faulkner and Vikulov 2001; Blake and Sinclair 2002; Taylor and Enz 2002; Okumuş, Altınay, and Hüseyin 2005). Collectively, these studies have argued strongly for ensuring that strategic plans and procedures are in place.

While research has explored various aspects of crisis management, we note a paucity of theoretical and conceptual frameworks that embrace the role of information and knowledge management. Most crisis management models emphasize the importance of seamless dissemination of information and knowledge, but few researchers have explicitly incorporated knowledge management principles in their models. We discern at least two chief reasons that knowledge management principles should be integrated into crisis management plans. First, unlike many others, the hospitality and tourism industry is a fragmented, complex mix of numerous stakeholders. In times of crises, only a cooperative and concerted effort by these entities will help mitigate the adverse effects. Second, the hospitality and tourism business landscape is dominated by independent small- and medium-sized enterprises that most often do not possess sufficient resources or tools to effect a crisis plan (Billing and Chen 2004). As a result, we argue that only a collaborative network of organizations can foster the processes and strategies needed to manage unwarranted situations. Furthermore, we think it makes sense to meld recent thinking in knowledge management with the many advances in information technologies and their associated tools. To this end, we attempt to achieve the following objectives in this study:

1. explore the role of knowledge management and knowledge management systems in enhancing the effectiveness of crisis management and planning,
2. develop a typology of various crises based on the perceptions and knowledge needs of hospitality managers, and
3. present a design concept of a collaborative knowledge-based crisis management system that has the potential to enhance the crisis preparedness of the hospitality and tourism industry.

Knowledge-Based Crisis Management

It is important to note that, for the sake of consistency, we apply the term *crisis* to include natural disasters, although

literature has proposed various classification schemes to delineate the differences between a crisis and a disaster (for example, see Shaluf, Ahmadun, and Said 2003). Despite these differences in perception, it is generally agreed that crisis situations are (1) highly ambiguous, with unpredictable outcomes; (2) have no known probability of occurrence but nevertheless pose a major threat to the survival of the organization; and (3) offer little or no time for the stakeholders to respond (Dutton 1986).

The literature has accommodated two different viewpoints regarding crisis management. One group of scholars (e.g., Perrow 1984; Gephart 1984) argued that crises are recurring and not preventable; whereas others (e.g., Mitroff, Pearson, and Harrigan 1996; Roberts 1990) contended that there are ways through which organizations can prevent, manage, or mitigate the effects of crises. To bridge this gap, Pearson and Clair (1998, 61) provided the following concise definition of crisis management:

> Crisis management is a systematic attempt by an organization and its stakeholders to manage or prevent crises from occurring, such that key stakeholders believe the success outcomes outweigh the failure outcomes.

According to Pearson and Mitroff (1993), four major issues should be analyzed as a part of every crisis management strategy, namely (1) types of crisis, (2) phases through which the crisis moves, (3) systems and factors that cause or prevent a crisis, and (4) stakeholders involved.

Building on this stream of research, Faulkner (2001) developed the first comprehensive model for crisis management in the tourism industry. An important facet of this model was to integrate hospitality and tourism organizations and the local communities into the crisis management process. Since the hospitality and tourism industry is deeply embedded in local communities, both the industry and its community need to be coordinated in crisis situations. Our model follows the approach of Faulkner, who lists the following six stages of crisis management:

1. *preevent phase*, where potential crisis can be planned for or prevented;
2. *prodromal phase*, when it is apparent that a crisis is imminent;
3. *emergency phase*, when the effects of the disaster are felt and actions are necessary to protect people and property;
4. *intermediate phase*, when short-term needs of the people have been addressed and restoration activities begin;
5. *long-term phase*, when the recovery activities have been institutionalized and the organization, the community, and its stakeholders return to the status before the disaster; and
6. *resolution and feedback phase*, when organizations learn from the crisis and develop updated processes to address the crisis experience.

At each phase, there are numerous actions that the community and the industry can take to deal with a crisis. Similarly, Ritchie (2004) elaborated on a more strategic and holistic crisis management approach consisting of three stages: (1) *crisis-prevention planning stage*, which involves planning and formulation of policies and procedures; (2) *strategic-implementation stage*, which operationalizes the procedures and policies and includes proper communication and control, as well as resource management and allocation; and (3) *resolution, evaluation, and feedback stage*, which involves crisis recovery and recording any lessons learned.

A common feature of these models is their strong emphasis on efficient

dissemination of information and knowledge and communication between all the relevant stakeholders of a destination. However, the models often do not elaborate on the processes by which knowledge is produced, shared, and used in the actual time of need. Part of the challenge is to understand the objectives and then to provide relevant knowledge to the right personnel in the right place and at the right time. Although that statement seems like simple common sense, the reality is that organizations face the following substantial challenges in attempting to manage the knowledge required for crisis management.

1. There is often a gap between what people plan for and what actually happens during a crisis. Therefore, organizations have to identify and acquire this critical knowledge from various sources from both within and outside the organization (Quarantelli 1988).
2. Organization members often make poor decisions during a crisis (Nunamaker, Weber, and Chen 1989). This happens because "organizational memory" is hard to maintain. Current organization members either do not know what to do or forget what was done in previous, similar situations. Sometimes they incorrectly believe that they have the required information or knowledge to make the right decisions. Furthermore, even when the right knowledge exists in the organization, it may not be available to the decision makers in timely fashion. Most of these issues arise because of the low frequency and ambiguity of crises, which means that only limited knowledge is available to deal with them. As a result, there exists a certain knowledge gap within organizations to understand how to plan for and respond to crises.
3. Crises create ambiguous and dynamic scenarios that can only be deciphered by people who have previous knowledge of such situations. Therefore, a major challenge in crisis management is to rapidly find experts (both within and outside the organization) who have experience or knowledge of managing particular crisis situations (Boin and Lagadec 2000). However, even when organizations collect such knowledge, they do not always have the appropriate mechanisms to use it.

The complexity and predominance of numerous small- and medium-sized organizations amplify these challenges in the tourism industry.

In this context, we suggest that by applying knowledge management principles, hospitality and tourism organizations can vastly improve their crisis management efforts by improving the acquisition and dissemination of critical information. Knowledge management can not only assist decision makers in doing their jobs efficiently but can also enable organizations to share and reuse different resources effectively. Our logic is that knowledge management enables organization members to work together to generate new ideas that can help the organizations deal with any critical situation. With the advent of technological channels, organic communications and sharing will naturally facilitate efficient thinking to establish mechanisms that may increase crisis management efficiency. In the subsequent sections, we introduce and explore various aspects of knowledge management as it relates to crisis management.

Knowledge Management Principles

Knowledge management can be defined as the set of systemic and organizational

processes incorporated to manage organizations' knowledge (Alavi and Leidner 2001). An organization's knowledge is the professional intellect, including both what and how, and the experiences, values, and beliefs of its members (Nonaka, Takeuchi, and Umemoto 1996). There is a general agreement on the major forms of knowledge that exist within organizations. Those are *explicit knowledge*, which can be codified and physically stored in databases; and *tacit knowledge*, which consists of the mental models and experience of individuals (in the form of specific experience, expertise, knowledge, and intuition), and which is closely associated with the individual who possesses it. Furthermore, since knowledge is embedded in organizational routines and tasks, it can be identified or exchanged only through the involvement of the individuals owning it. Recognizing this social nature of knowledge, some researchers (Nonaka and Takeuchi 1995; Bose and Sugumaran 2003) proposed knowledge management frameworks that essentially consist of the following three processes: (1) *acquisition and storage*—knowledge is identified and collected from various sources of the organization, converted into explicit form, and stored in organizational repositories; (2) *retrieval, dissemination, and use*—relevant knowledge is distributed to employees and subunits of the organization where and when it is required; and (3) *evaluation and feedback*—knowledge is used and evaluated by the employees for its effectiveness, with feedback guiding further knowledge acquisition.

If knowledge is a critical input in every organizational process, and if efficiency requires that it should be stored and managed in specialized forms by every organizational member, then the primary task of the organization should be to integrate these various forms of knowledge (Grant 1996). Knowledge integration is determined by the following three major factors: scope, efficiency, and flexibility of integration (Huang and Newell 2003). The scope of integration determines the level of complexity and differentiation of existing knowledge. As the need for a sufficient level of knowledge grows, so will the complexity of the integration process. The scope of integration also determines its efficiency. Integration efficiency is achieved when there is sufficient congruence between the levels of common knowledge possessed by the transacting entities. The more complex the required common knowledge, the higher is the bar to achieve efficiency. The degree of integration flexibility reflects on the willingness and capacity of the organization to reconfigure the existing forms of knowledge and acquire new forms of knowledge needed for increased efficiency.

Knowledge-Based Crisis Management Framework

We develop a knowledge-based crisis management framework by combining the fundamental principles of knowledge management with the crisis management strategies discussed in the previous sections. It should be noted that the knowledge management framework is not oriented toward any particular kind of representation or processor. The fundamental focus will be on identifying classes of knowledge resources, the basic activities or processes influencing the management of knowledge, and how this knowledge can be efficiently integrated and used by tourism and hospitality organizations at various stages of a crisis situation.

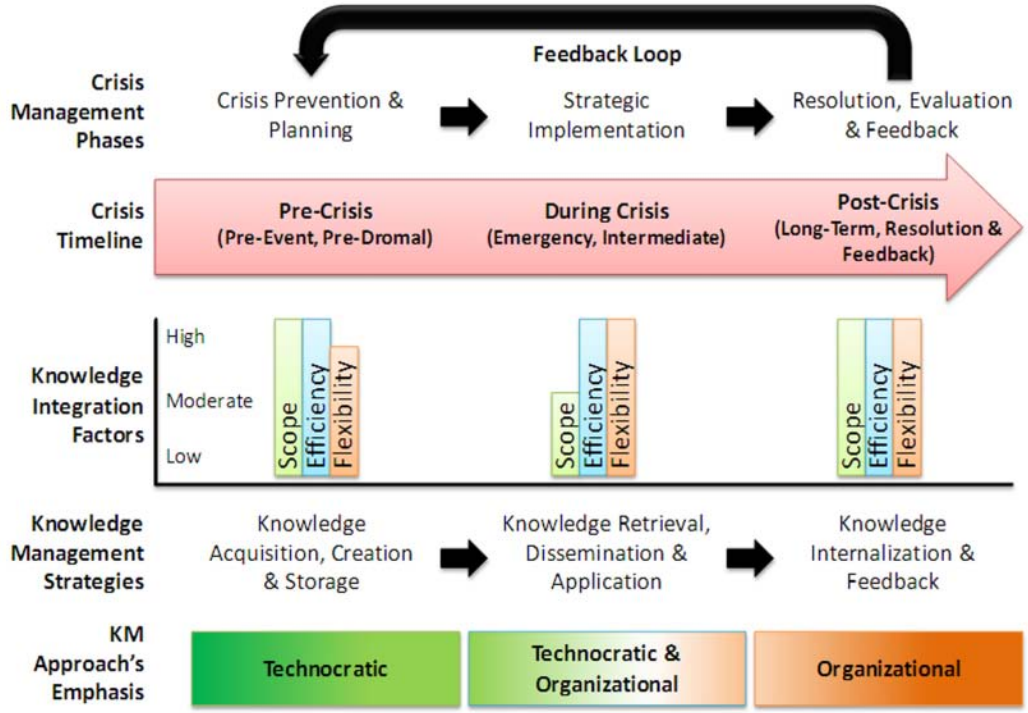
Let us look at the particular knowledge management issues that face the hospitality and tourism industry as a result of its mix of fragmented and heterogeneous yet interrelated entities. Each entity has its own procedures for processing information and

retaining knowledge. Therefore, transferring knowledge is a complex task. Moreover, the distributed nature of the knowledge within each organization and among various organizations inhibits sharing of knowledge between organizations. Increasing the complexity of knowledge management is the fact that crisis situations by definition present a unfamiliar scenarios. To achieve the task of developing a useful framework, we employ two factors that can determine the appropriate knowledge management strategies. These are the types of knowledge (explicit or tacit) and the sources of knowledge (technical databases or human resources and organizational routines). Combinations of different levels of these factors, as well as the phase of the crisis, determine whether to apply a technocratic approach or an organizational approach to knowledge management (Earl 2001). The technocratic approach emphasizes the use of technology-enabled tools, including web search engines and online databases. The contrasting organizational approach promotes the use of networks and communities for developing and sharing organizational and individual knowledge (Bouncken 2002). The conceptual model shown in Exhibit 1 combines these two approaches with the knowledge management processes (acquisition and storage; retrieval, dissemination, and use; and evaluation and feedback), while taking into account the scope, efficiency, and flexibility of each phase of the crisis.

As depicted in the model, knowledge acquisition, creation, and storage activities are most relevant during the preevent and prodromal stages of the crisis. At this point, the organization seeks problem recognition through environmental scanning and historical data analysis and determines the scope of knowledge needed to plan for a crisis (Wang and Belardo 2005). When integrating knowledge in this phase, the scope should be broad enough to explore relevant perspectives with efficient acquisition. The technocratic approach is appropriate for this stage, to enhance the sources of knowledge (e.g., databases, web crawlers). Highly useful knowledge includes government regulations, scenario planning details, and information regarding emergency and relief agencies. These sources can be systematically categorized and codified into electronic databases or repositories along with identified experts so that people with the right expertise and experience can be included in databases of content experts and linked to the knowledge bases for easy access (D'Amore 2005). This ensures that knowledge is derived not only from objective data (i.e., codified knowledge) but also from specific experiences. These activities should be performed dynamically and actively to keep the crisis management knowledge up to date with the changing environment.

Knowledge retrieval and dissemination processes are activated when the crisis occurs, labeled as the strategic implementation phase (emergency and intermediate stages). These processes are supported by both the technocratic and organizational approaches to knowledge management. During this phase, the scope of knowledge integration is moderate and focused on specific actions for the crisis at hand, while efficiency is the key (Belardo, Duchessi, and Coleman 1994). An analysis of many hospitality and tourism crises indicates that one noteworthy reason for large loss of life or property is the lack of proper communication and coordination between the various entities in the destination, which forces individuals and businesses to act in isolated fashion. Maintaining an efficient knowledge distribution system can mitigate this situation (Barton 1994). In this regard, a primary requirement is to create situational awareness so that the relevant stakeholders can make sense of the specific problem

Exhibit 1:
Conceptual Framework for Knowledge-Based Crisis Management



with appropriate guidance. It is important to maintain the availability of technical knowledge bases and the supporting communication infrastructure so that the crisis management guidelines and action plans can be put into action.

The organizational approach to knowledge management provides relevant strategies during the late phases of a crisis, when an organization needs experienced people who can make sense out of the knowledge acquired and act accordingly. Thus, people with prior experience in managing such situations are a resource that cannot be replaced by technical databases (O'Leary 1998).

The learning, evaluation, and feedback processes are most relevant in the postcrisis phase of long-term recovery and organizational learning. During this phase, the need for knowledge integration reaches its maximum, meaning that organizations must be flexible to continuously evaluate their knowledge needs and modify their knowledge management strategies. The organizational knowledge management approach is emphasized in this stage, as organization members internalize knowledge and review feedback. Organizations should capture essential experiential knowledge for their knowledge base. Furthermore, the stakeholders also get an opportunity, both individually and collectively, to reevaluate the usefulness of the knowledge collected before the crisis and suggest new requirements. Depending on the nature of the crisis, government may become involved in encouraging networks of stakeholders. These networks and communities can be both intraorganizational

or interorganizational depending on the knowledge need. The fundamental premise is that knowledge is a specialized experience that is intrinsically linked to the individual who possesses it. Sharing knowledge becomes a pivotal necessity, and the best way to disseminate and exploit this knowledge is to form networks and communities within which individuals can interact, share, and learn from one another's experiences to create a dynamic feedback of knowledge. This learning and feedback loop directly impacts the knowledge acquisition and storage processes of the organization for crisis prevention and planning in the next cycle.

Applying the Knowledge Management Framework: A Design Concept for Crisis Management Systems

With a goal of developing a design for an IT-enabled crisis management system for the hospitality and tourism industry, we proceeded with the following two steps.

First, we conducted an exploratory study to understand the current crisis awareness and preparedness of the lodging industry. The data gathered from this study helped us develop a typology of various crises faced by lodging organizations. We believe that this typology will formalize conceptualizations of crises, which so far have been intuitive and dichotomous (e.g., natural versus man-made). This simplicity does not provide sufficient utility or the level of detail that reflects the complexity of a crisis. Moreover, the typology helps define the scope of the information and knowledge that needs to be collected and stored in an IT-enabled knowledge management system. Although not exhaustive, this typology can be a good starting point to develop an industry-specific taxonomy of crisis-related knowledge (that is, a list of concepts and relationships among them). This process also helps define the knowledge needs of the target population with regards to the subject matter.

In the second step, we build on the knowledge management framework to envision an IT-enabled collaborative crisis management system that has potential applications for the hospitality and tourism industry. Through this design concept, we analyze the relevance of various IT tools and knowledge management strategies and the potential challenges in such a task.

Exploratory Study of Crisis Awareness in the Lodging Industry

Our initial test of this model employed a convenience sample of lodging firms in the greater Philadelphia region (which comprises eleven counties in the states of Pennsylvania, New Jersey, and Delaware). This region has experienced tremendous growth in the number of visitors and overnight stays in the past few years. In 2005, the region generated 27.3 million person-trips, which translated into $10.08 billion in economic impact and supported 127,000 jobs—accounting for $3.82 billion in wages and $1.38 billion in federal, state, and local taxes (Greater Philadelphia Tourism Marketing Corporation [GPTMC] 2007). Given the size of the Philadelphia-area lodging industry, the economic consequences of a crisis affecting it would be considerable. Despite the importance of crisis preparedness, we are aware of few efforts by the industry or governmental agencies to develop comprehensive crisis plans. Some companies (e.g., chain hotels) have the necessary financial and human resources that put them in a position to work on their own plans, but small and medium-size organizations (e.g., independent properties or travel operators) often lack resources or expertise for crisis plans. We think that industry agencies in a particular region are the logical candidates

Exhibit 2:
Descriptive Statistics of the Surveyed Lodging Operators

Category	*Items*	*Frequency*[a]	*Percentage*
Management structure	Independently owned/ managed	26	56.5
	Independent management company	16	34.8
	Franchise	3	6.5
	Others	1	2.2
Average annual revenue ($US)	Less than $50,000	9	19.1
	$50,001 to $250,000	7	14.9
	$250,001 to $500,000	2	4.3
	$500,001 to $1,000,000	4	8.5
	Greater than $1,000,000	23	48.9
Number of employees	Less than 20	22	46.8
	20 to 50	10	21.3
	51 to 100	5	10.6
	101 to 150	2	4.3
	151 to 200	3	6.4
	More than 200	4	8.5

a. The frequency does not add up to 48 due to certain missing data points (listwise) in the survey.

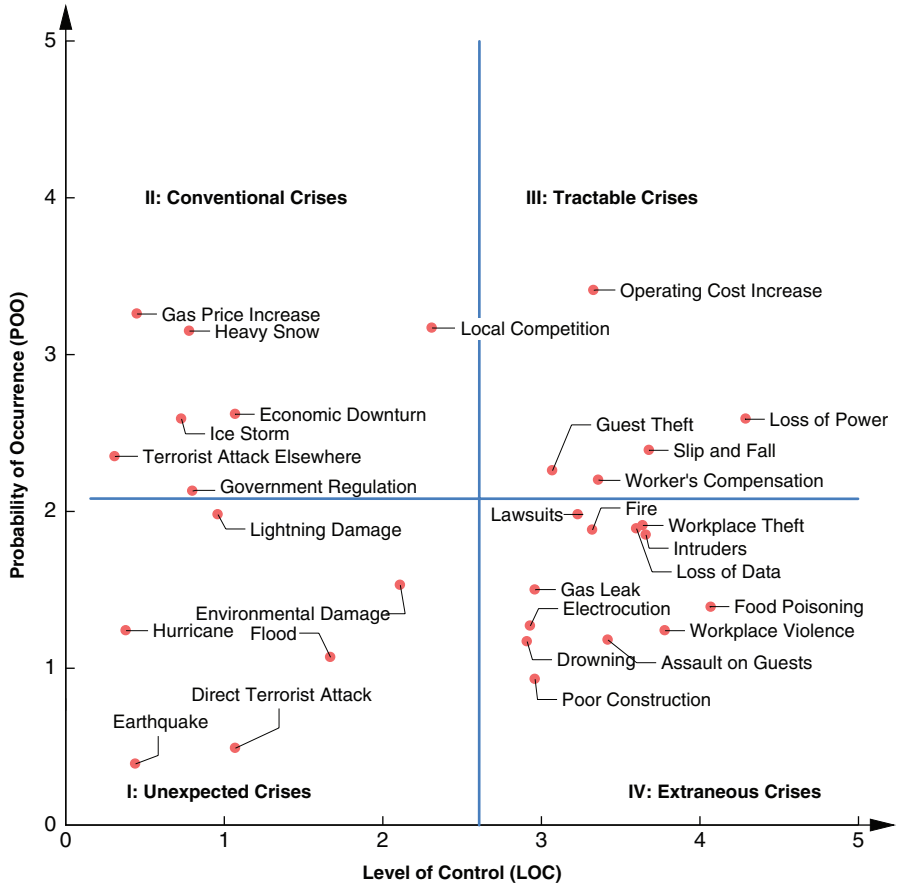
to cooperate in disaster planning, and so we studied those agencies.

Crisis Perceptions Survey: We conducted our study of the lodging firms at the end of 2006. The survey was designed to elicit the perceptions of senior managers or owners in each organization (Quarantelli 1988).

The survey was carried out in three phases. In the first stage, we solicited lodging operators of various management structures and sizes up to 150 rooms, since our primary purpose is to study the risk management practices in small and medium-size companies. We distributed paper-and-pencil or electronic versions of the survey to 199 registered members firms of the Pennsylvania Hotel & Lodging Association and the New Jersey Hotel & Lodging Association, which had agreed to participate. (Hard copy forms went to respondents who did not provide their e-mail addresses to the association.) The online survey was distributed by the local chapter presidents via an e-mail describing the objectives and expected benefits of survey. In the end, we received a total of 56 responses (response rate was about 28 percent, with 35 electronic and 21 paper-based surveys), 8 of which we had to discard due to incomplete data. We found no significant differences in the responses from the electronic and hard copy survey, based on chi-square and *T*-tests, and thus combined them for analysis. The basic descriptive characteristics of the surveyed firms are shown in Exhibit 2.

The survey Instrument: To develop the survey, we interviewed managers from three risk management consulting firms that have worked closely with the region's lodging companies. We combined the information from the interviews with an extensive review of industry and academic literature to develop the survey. The survey questions were grouped into three sections. The first section contained questions concerning the characteristics of the firms,

Exhibit 3:
Crisis Typology as Perceived by Surveyed Lodging Operators



while the third section included questions about the source of crisis or risk management advice.

The second section was the key portion of the survey. This section asked the managers to rate thirty crises on perceived probability of occurrence and perceived level of control. These crises included natural disasters and operational risks. We asked the respondents to rate each crisis on probability of occurrence and level of control using a 5-point Likert-type scale on which the numbers corresponded to percentages on the two variables (e.g., 1 denoted up to a 20 percent probability of occurrence and level of control) (Gundel 2005). Probability of occurrence is defined as the perceived probability of a particular crisis occurring at certain place, time, or manner. Similarly, level of control is defined as the perceived range of actions available to mitigate the effects and damages resulting from a crisis. The logic behind these measures is that unless the managers feel that they have some degree of control over the scenario, they will not put in any effort to learn about the problems.

Our analysis focused mainly on categorizing crises which share common response measures. Based on the data, we developed the two-by-two matrix shown in Exhibit 3, with probability of occurrence

(low or high) on the Y-axis and level of control (low or high) on the X-axis. The two reference lines as seen in the exhibit were drawn to enable interpretive clarity rather than to denote specific values.

Quadrant I. Unexpected crises are the types of occurrences that are hard to predict, because they have a low probability of occurrence and a low level of control. This quadrant includes events that would be considered rare for the Philadelphia region, such as direct terrorist attacks, earthquakes, and hurricanes. Though they are anomalous or infrequent, these crises (should they occur) develop across or affect large geographical areas. The types of knowledge required to deal with such crises include long-term expertise development in areas that can provide the required knowledge and training to suit local scenarios.

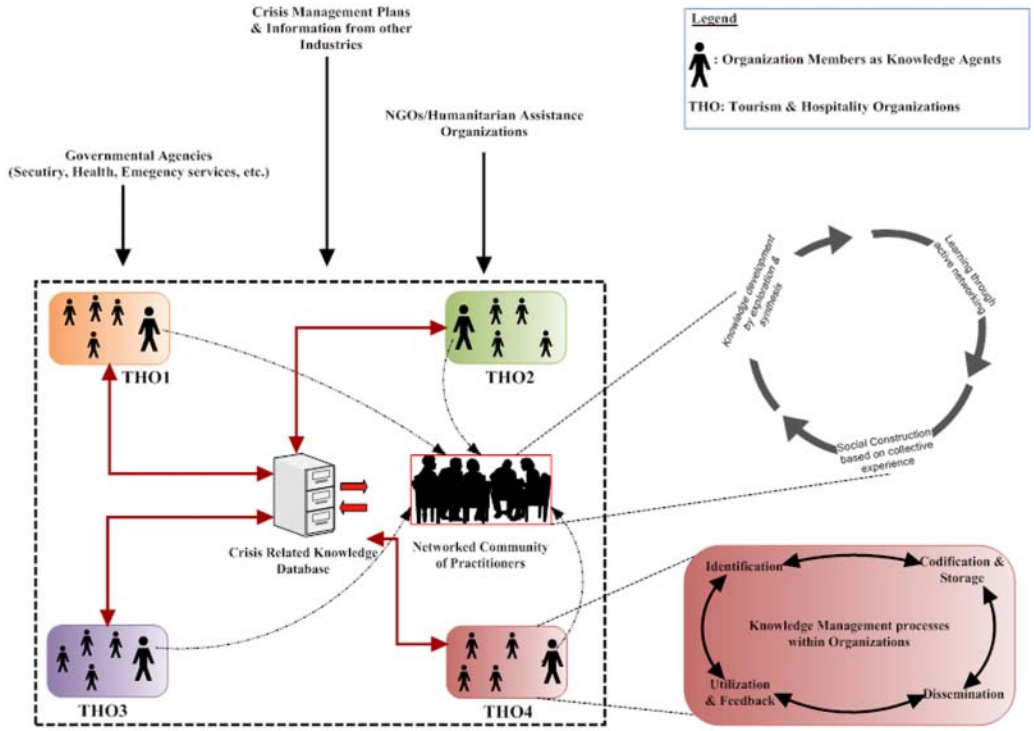
Quadrant II. Conventional crises are predictable events that nevertheless feature a low level of control despite their high probability of occurrence. Blizzards, gas price increases, government regulations, and economic downturns were some of the crises that characterize this quadrant. Since they are extraneous, these crises cannot be easily controlled by individual organizations. Typical countermeasures involve coping rather than attempting to control them. Thus, even though the level of control is low, the common occurrences of these crises provide opportunities for organizations to engage in substantial learning regarding how to deal with them.

Quadrant III. Tractable crises include those that have both a relatively high predictability and high level of control. Crises such as rampant inflation, guest theft, workers' compensation claims, and loss of power constitute this quadrant. These crises result in relatively direct financial losses and are a threat to the competitive viability of the organization. Knowledgeable staff and management coupled with proper investments in technology and equipment can develop sufficient countermeasures to help mitigate tractable crises. Interestingly, we note that countermeasures aimed at these crises also improve the hotel's service quality. Actions taken to prepare for or manage these crises can also improve the hotel's competitive position.

Quadrant IV. Extraneous crises include irregular operational crises such as fire, food poisoning, drowning, a gas leak, or loss of enterprise data. These crises are characterized by a relatively low probability of occurrence but a relatively high level of control. Some of these situations may seem negligible, and our interviews with the risk management professionals indicated that such crises are sometimes ignored by the organizations. Since the probability of these events is low, management may be careless in preempting them, until they lead to loss of life, property, or goodwill. The key to dealing with these crises is to establish risk prevention processes that comply with OSHA and other regulations and develop operational procedures from the best industry practices. Key areas of knowledge in this regard include managing regulatory and policy information, as well as developing best practices and well-trained employees.

Regardless of the type of crisis (that is, its position on the typology), dealing with a crisis requires substantial effort. Small and medium-size operations might not have mitigation processes in place for less probable crises, such as earthquakes or terrorist attacks, and therefore dealing with them requires sufficient national and local expertise (e.g., evacuations and medical assistance). Because of their scale, such crises affect the larger social and economic system and thus require extensive information exchange and coordination with external agencies. Even relatively small operational crises can jeopardize the

Exhibit 4:
Design Concept of a Collaborative Crisis Management System for the Hospitality and Tourism Industry



regular functioning of an organization, and so staff and management need to become knowledgeable about the right procedures to mitigate possible loss. Let us underscore the point that knowledge is a critical asset.

Collaborative Knowledge-Enabled Crisis Preparedness and Management Systems

We envision a design concept for IT-enabled regional crisis management systems that can assist the industry's need for regional crisis management. The system concept and the associated components are graphically presented in Exhibit 4. The basic architecture for such collaborative systems is based on the two schools of thought that we mentioned above, the technocratic approach and the organizational approach (Earl 2001).

The technocratic approach to knowledge acquisition and retention. Although the importance of information and knowledge is self-evident during a crisis, it proves difficult to collect and validate relevant material, because of the challenge inherent in consolidating the critical knowledge that is widely distributed across multiple organizations (including the government agencies). Once the information is consolidated, a further challenge is to create efficient mechanisms to distribute it at the right place and the right time. Given the advancements in technology, this job can be performed by well-managed technical repositories.

Organizational approach of collaborative knowledge networking. An important

goal for efficient communication among organizations is to create a technology platform wherein individuals from different tourism and hospitality organizations collaborate and create a common ground for learning and generate contexts for action. Exhibit 4 shows four generic organizations, labeled THO. Since crisis-related knowledge is vast, mere availability of technical information through databases is not sufficient. Rather, there should be a community of users who understand this information and then communicate with each other to create action plans. Such a knowledge community supports members and organizations to pool the necessary resources and ideas needed for crisis management.

Together, the technology enabled knowledge base and the collaborative community of practice should achieve the following objectives:

- *Experience and knowledge retention:* Much of the experience (tacit knowledge) gained by the organizations and individuals is needed to guide the planning and preparedness for future crises scenarios.
- *Content reprioritization:* Reprioritize current conceptualizations and relevant contents to make them relevant in today's complex environment.
- *Networking efficiency:* Enhance knowledge transformation and intelligence sharing within the network of industry professionals.

We next discuss the functionality and relevance of the knowledge base and the network.

Knowledge Base

In the context of crisis management, relevant knowledge includes situation awareness, needs assessment, emergency contact information, and any analysis of previous crisis situations. Developing a knowledge base relies on two important processes: domain deconstruction (i.e., conceptualization and categorization) and knowledge reconstruction through ontology development and database creation (Neha, Racherla, and Hu 2007). The project thus involves extracting information from different explicit and documented resources and then synthesizing new information or knowledge. One could apply the crisis typology presented above to help determine the scope of needed knowledge and thereby ensure that the knowledge thus organized is relevant. This also establishes common crisis management language and reduces possible knowledge barriers between heterogeneous organizations.

Another key element is the linking together of the extracted information to form new propositions or hypotheses that can be explored further, the process known as ontology, which we have mentioned above. This step of knowledge codification and storage is an important activity (described in our framework) in which knowledge is classified into a common and machine readable format for easy distribution. The knowledge base functions as a centralized knowledge repository and provides the following functionalities:

- maintaining historical and updated information for crisis management;
- functioning as a federated resource for codifying and creating new knowledge;
- organizing systematic knowledge, best practices, and proven crisis management strategies;
- providing recommendations for courses of action before, during, and after a crisis situation; and
- enabling effective retrieval of information and promoting new uses of the system to support knowledge-based inference and problem solving.

Another worthwhile addition to the knowledge base can be to link the specific

content to a list of available experts, allowing instant access to the person who created or is aware of some particular knowledge. We think such a directory makes information retrieval a more personable process rather than just an interaction with technology.

Networked Community

A key insight of knowledge management is that the system should facilitate knowledge flow from the person who knows to the person who needs to know within (or across) organizations, while knowledge evolves and grows during such process (Bose 2004). The coherent integration of knowledge that is dispersed throughout an organization is essential to the effectiveness of knowledge management. Just as knowledge is shared in an organization, so must crisis management communities be fostered throughout a region. The networked community uses the IT platform to establish collaborations across organizational, geographic, or even temporal barriers. The functions of a networked community can be summarized as follows: (1) create a network of experts and individual employees belonging to the relevant stakeholder organizations in a destination and (b) provide tools that enable efficient search of relevant experts and expertise. We believe that the community forums are an effective way to facilitate informal discussion among participating expert members without formal intervention. This is particularly facilitated by internet tools, including the interactive web sites.

Issues and Challenges to Developing Collaborative Systems

We emphasize that the development of knowledge management systems is a nonlinear process that engenders certain operational and strategic challenges. Typical issues are coordination, negotiation, and technical interoperability. We identify and briefly discuss some of these potential challenges.

At the operational level, one of the primary challenges is to design the system and its components to ensure an interoperable language between various entities. Moreover, determining the proper scope for the knowledge base creates a dilemma. On one hand, a broad scope for collecting and storing knowledge may lead to information overload and inefficient information processing. On the other hand, if the scope is too limited, it can lead to insufficient information (Subramani and Hahn 2000). A similar dilemma exists in determining the number and diversity of knowledge sources. Critical mass perspective (Culnan 2005) suggests that the knowledge seekers' value for collaborative systems increases geometrically with the increase in the number of people participating in the network. The lack of diversity leads to limited knowledge resources, which constrains the system to the members who do not see what is new. On the other hand, the increase in number of network participants beyond a certain point leads to irrelevant content, information overload, and duplication, as well as difficulties in creating a shared vocabulary. In this regard, organizations can use helpful new technologies including collaborative filtering technologies (Haase, Völker, and Sure 2005; Chua 2004), data visualization tools (Zimmerman 2006), and agent-based profiling systems (Nissen and Levitt 2004) that feed knowledge based on the profile of the knowledge seeker.

At the strategic level, two specific challenges need to be addressed, namely, the perspective regarding action time lines and organizational and cultural barriers.

Some organizations are capable of reacting quickly with rescue activities, while some others take a long-term perspective aimed toward reconstruction and humanitarian relief. Those two perspectives represent contrasting knowledge needs and structures for strategizing actions. Because of the high number of participating entities, coordination often becomes an issue, and information exchange also suffers as a consequence. Perhaps even more important than the differing time perspectives is the challenge associated with knowledge sharing and collective action. Research in online communities and knowledge management systems (Jones, Ravid, and Rafaeli 2004; Wasko and Faraj 2005) suggests that culture is the single most important factor in determining the success of knowledge-sharing systems. Even more problematic is the matter of diverse goals. Many organizations operate according to their own agenda in a crisis, for example, by attempting to draw special attention to their particular needs. If organizations compete with one another for resource allocation, the result is conflict and mistrust, which prevents knowledge sharing. A related issue is the lack of inherent ability or motivation to share knowledge (Riege 2005).

Conclusions and Future Outlook

Our goal in this article is to integrate knowledge management concepts to enhance the effectiveness of crisis planning and management in the hospitality and tourism industry. We believe that collaborative knowledge management systems can improve the industry's crisis preparedness and management. To that end, we offer a framework for knowledge management in a crisis. Given the nature of crises, we urge robust crisis planning, which requires active preparation through training and exercises. It is virtually impossible for any organization, especially those of small and medium size, to single-handedly prepare for all risks. To face this challenge, hospitality and tourism organizations should be encouraged to participate in common platforms of knowledge by contributing best practice experiences and to share distributed knowledge for better crisis preparedness and responses.

Future research might study how knowledge management actually operates. Given the potential for working at cross-purposes, research should try to understand the attitudes and beliefs of participating organizations and study the dynamic roles of knowledge networking and community of practice. These aspects are directly related to contextual and tacit knowledge, which is considered to be most difficult to capture and share. Another interesting line of inquiry would be to identify the main barriers or enablers for effective knowledge management implementation in the hospitality and tourism industry. Studies of this kind should provide rich insights into the science and psychology of knowledge collaboration in dispersed environments.

References

Alavi, M., and D. E. Leidner. 2001. Review—Knowledge management and knowledge management systems: Conceptual foundations and research issues. *MIS Quarterly* 25 (1): 107-36.

Alavi, M., and A. Tiwana. 2002. Knowledge integration in virtual teams: The potential role of KMS. *Journal of the American Society for Information Science and Technology* 53 (12): 1029-37.

Barton, L. 1994. Crisis management: Preparing for and managing disasters. *Cornell Hotel and Restaurant Administration Quarterly* 35 (2): 59-65.

Belardo, S., P. Duchessi, and J. R. Coleman. 1994. A strategic decision support system at Orell Fussli. *Journal of Management Information Systems* 10 (4): 135-57.

Billing, P., and R. J. C. Chen. 2004. Bridging the gap: Towards a knowledge-based development model for tourism SMEs. Paper presented at the annual conference of the International Society of Travel and Tourism Educators, Hong Kong, SAR, China, September 26-28.

Blake, A., and T. Sinclair. 2002. Tourism crisis management: Responding to September 11. Discussion Paper no. 2002/7, Christel DeHaan Tourism and Travel Research Institute, Nottingham University Business School, Nottingham, UK.

Boin, A., and P. Lagadec. 2000. Preparing for the future: Critical challenges in crisis management. *Journal of Contingencies and Crisis Management* 8 (4): 185-91.

Bose, R. 2004. Knowledge management metrics. *Industrial Management & Data Systems* 104 (6): 457-68.

Bose, R. and V. Sugumaran (2003). Application of knowledge management technology in customer relationship management. *Knowledge and Process Management,* 10 (1), 3-17.

Bouncken, R. B. 2002. Knowledge management for quality improvements in hotels. *Journal of Quality Assurance in Hospitality & Tourism* 3 (3-4): 25-59.

Caponigro, J. R. 2000. *The crisis counselor: A step-by-step guide to managing a business crisis*. Chicago: Contemporary Books.

Culnan, M. J. (2005). Online communities: Infrastructure, relational cohesion and sustainability. Paper presented at the Workshop on Social Informatics: Extending the Contributions of Professor Rob Kling to the Analysis of Computerization Movements, Irvine, CA

Chua, A. 2004. Knowledge management system architecture: A bridge between KM consultants and technologists. *International Journal of Information Management* 24 (1): 87-98.

D'Amore, R. 2005. Expertise tracking. Paper presented at the 2005 International Conference on Intelligence Analysis, McLean, VA, May 2-6.

Dutton, J. E. 1986. The processing of crisis and non-crisis strategic issues. *Journal of Management Studies* 23 (5): 501-17.

Earl, M. J. 2001. Knowledge management strategies: Toward a taxonomy. *Journal of Management Information Systems* 18 (1): 215-33.

Faulkner, B. 2001. Towards a framework for tourism disaster management. *Tourism Management* 22 (2): 135-47.

Faulkner, B., and S. Vikulov. 2001. Katherine, washed out one day, back on track the next: A post-mortem of a tourism disaster. *Tourism Management* 22 (4): 331-44.

Gephart, R. P., Jr. 1984. Making sense of organizationally based environmental disasters. *Journal of Management* 10 (2): 205-25.

Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal,* 17 (1), 109-122.

Greater Philadelphia Tourism Marketing Corporation (GPTMC). 2007. *Tourism 2007: Report to the industry*. Annual Report. Philadelphia: Greater Philadelphia Tourism Marketing Corporation.

Gundel, S. 2005. Towards a new typology of crises. *Journal of Contingencies and Crisis Management* 13 (3): 106-15.

Haase, P., J. Völker, and Y. Sure. 2005. Management of dynamic knowledge. *Journal of Knowledge Management* 9 (5): 97-107.

Huang, J. C., and S. Newell. 2003. Knowledge integration processes and dynamics within the context of cross-functional projects. *International Journal of Project Management* 21 (3): 167-76.

Jones, Q., G. Ravid, and S. Rafaeli. 2004. Information overload and the message dynamics of online interaction spaces: A theoretical model and empirical exploration. *Information Systems Research* 15 (2): 194-210.

Mitroff, I. I., C. M. Pearson, and L. K. Harrigan. 1996. *The essential guide to managing corporate crises: A step-by-step handbook for surviving major catastrophes*. New York: Oxford University Press.

Nissen, M. E., & R. E. Levitt (2004). Agent-based modeling of knowledge dynamics. *Knowledge Management Research & Practice,* 2 (3), 169-183.

Nonaka, I., and H. Takeuchi. 1995. *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. New York: Oxford University Press.

Nonaka, I., H. Takeuchi, and K. Umemoto. 1996. A theory of organizational knowledge creation. *International Journal of Technology Management* 11 (7-8): 833-45.

Nunamaker, J. F., Jr., E. S. Weber, and M. Chen. 1989. Organizational crisis management systems: Planning for intelligent action. *Journal of Management Information Systems* 5 (4): 7-32.

Okumuş, F., M. Altınay, and A. Hüseyin. 2005. The impact of Turkey's economic crisis of February 2001 on the tourism industry in Northern Cyprus. *Tourism Management* 26 (1): 95-104.

O'Leary, D. E. (1998). Knowledge acquisition from multiple experts: An empirical study. *Management Science,* 44 (8), 1049-1058.

Pearson, C. M., and J. A. Clair. 1998. Reframing crisis management. *Academy of Management Review* 23 (1): 59-76.

Pearson, C. M., and I. I. Mitroff. 1993. From crisis prone to crisis prepared: A framework for crisis management. *Academy of Management Executive* 7 (1): 48-59.

Perrow, C. A. 1984. *Normal accidents: Living with high risk technologies*. New York: Basic Books.

Quarantelli, E. L. 1988. Disaster crisis management: A summary of research findings. *Journal of Management Studies* 25 (4): 373-85.

Richardson, B. 1994. Crisis management and management strategy: Time to loop a loop? *Disaster Prevention and Management: An International Journal* 3 (3): 59-80.

Ritchie, B. W. 2004. Chaos, crises and disasters: A strategic approach to crisis management in the tourism industry. *Tourism Management* 25 (6): 669-83.

Riege, A. (2005). Three-dozen knowledge-sharing barriers managers must consider. *Journal of Knowledge Management,* 9 (3), 18-35.

Roberts, K. H. (1990). Some characteristics of one type of high reliability organization. *Organization Science,* 1 (2), 160-176.

Singh, N., P. Racherla & C. Hu (2008). Knowledge Mapping for Safe Festivals and Events: An Ontological Approach *Event Management,* 11 (1-2), 71-80.

Subramani, M., and J. Hahn. 2000. Examining the effectiveness of electronic group communication technologies: The role of conversation interface. Paper presented at the Academy of Management, Toronto, Canada.

Shaluf, I. M., F.-R. Ahmadun, and A. M. Said (2003). A review of disaster and crisis. Disaster Prevention and Management: *An International Journal,* 12 (1), 24-32.

Taylor, M. S., and C. A. Enz. 2002. GMs' responses to the events of September 11, 2001: Voices from the field. *Cornell Hotel and Restaurant Administration Quarterly* 43 (1): 7-20.

Wang, W.-T., and S. Belardo. 2005. Strategic integration: A knowledge management approach to crisis

management. Paper presented at the 38th annual Hawaii International Conference on System Sciences (HICSS 2005), Big Island, HI, January 3-6.

Wasko, M. M., and S. Faraj. 2005. Why should I share? Examining social capital and knowledge contribution in electronic communities of practice. *MIS Quarterly* 29 (1): 35-57.

Zack, M. H. (1999). Developing a knowledge strategy. *California Management Review,* 41 (3), 125-126.

Zimmerman, A. (2007). Not by metadata alone: the use of diverse forms of knowledge to locate data for reuse. *International Journal on Digital Libraries,* 7 (1), 5-16.

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