

# Emerging Risk: An Integrated Framework for Managing Extreme Events

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## **Abstract**

Today's complex, interconnected global environment has created borderless risk capable of rapidly spreading across geographic, societal and organizational boundaries. In this environment, extreme events compel greater attention due to their potential for generating expansive and catastrophic harm. One source of extreme events is emerging risk, which, as defined in this paper, is new (novel) risk that has not existed previously. Akin to the Black Swan as proposed by Nassim Taleb, emerging risk falls outside our customary cognitive and decision-making frameworks. This paper begins by exploring cognitive and behavioral theories that can be applied to explain why emerging risk is often overlooked, downplayed or ignored. The existing literature is also examined to identify approaches (including systems theory, scenario planning and anticipatory management) for enhancing our capacity to understand, identify and handle emerging risk. Finally, this paper proposes an innovative framework for managing emerging risk within an overall enterprise risk management (ERM) program. The suggested framework provides a practical approach for meeting the challenges of emerging risk, including the need for alternatives to traditional quantitative and predictive tools.

**Keywords:** Emerging risk; extreme events; trans-boundary risk; enterprise risk management.

## **Introduction**

Globalization has radically altered the playing field of contemporary risk management by making risk borderless and intractably altering the ways in which risk is generated, escalated and conveyed across geographic, societal and organizational boundaries. Under these conditions, extreme events compel greater attention due to their potential for generating expansive and catastrophic harm. Extreme events such as the BP oil spill dramatically illustrate the challenges of post-modern risk, which are arguably stretching the capabilities of existing risk management tools and approaches. In response, these conditions call for the development of new and innovative approaches, such as enterprise risk management.

This paper will focus on emerging risk, which has the potential to evolve into extreme events. Akin to Taleb's (2007) Black Swan, emerging risk exemplifies the extreme outlier event (low probability, high impact) whose potential is often downplayed or entirely overlooked. By virtue of its evolving nature, emerging risk is opaque, falling outside customary cognitive and perceptual frameworks.

The concept of emerging risk is introduced, defined and discussed in the first section of this paper. The second section of this paper presents a literature review that draws from existing scholarly works to synthesize an understanding of how emerging risk arises and incubates, often unnoticed or downplayed. The literature review section also draws from existing management theory (systems theory, chaos theory, anticipatory management, scenario planning, strategic foresight, environmental scanning) to identify possible approaches for more fully understanding, identifying and managing emerging risk. Finally, the paper concludes with a proposed innovative framework for managing emerging risk within an overall enterprise risk management (ERM) program.

Because there is little research on the topic of emerging risk, one objective of this paper is to help close an existing gap in the literature. By adding to the discourse on the topic of emerging risk, it is hoped this paper will contribute to both risk management theory and practice, including ERM. In this regard, a further objective of this paper is to identify how risk management practice might be enhanced through an understanding of emerging risk.

With regard to the anticipated contributions of this paper, it is noted that traditional risk management approaches have often involved the development and use of predictive models that seek to identify solutions. In contrast, this paper is premised upon the view that risk managers and management practitioners alike must seek to think beyond “final” solutions and answers that purportedly beget the need for further discussion. Instead, this paper hopes to challenge risk managers and management practitioners alike to avoid the complacency that can sometimes be associated with “final” answers, encouraging an approach that involves learning as much as possible about risk management while being “prepared to learn it all over again as circumstances change” (Fulmer 1991, 9).

Finally, it is suggested here that risk management is often discussed entirely apart from management, as though the two are separate and distinct. This paper is premised upon the notion that good management requires sound risk management, and the two concepts need to be considered in tandem. This paper will utilize an interdisciplinary and holistic approach, including a discussion of enterprise risk management, in order to tighten the connection between these two practice areas.

## **Part 1. Emerging Risk: Introduction and Contextual Discussion**

Before discussing the phenomenon of emerging risk, it is important to first understand the environment within which emerging risk is generated. Emerging risk finds its nexus in the conditions of the modern environment, which is global, dynamic, complex and interconnected (Giddens 1990). Globalization has radically altered the playing field of contemporary risk management by making risk borderless and intractably altering the ways in which risk is generated, escalated and conveyed across geographic, societal and organizational boundaries. “Globalization of risk” (Tacke 2001; Giddens 1999) has resulted in risk that is complex, incalculable (Beck 2007), delocalized and borderless (Smith and Fischbacher 2009).

These conditions of modernity give rise to three specific challenges, each of which is relevant to the phenomenon of emerging risk. First, interconnectedness and complexity make it increasingly difficult to ascertain and isolate causal factors that produce emerging risk. This leads to complexity challenges when dealing with emerging risk, the byproduct of an environment where “simple cause-and-effect relationships are steadily replaced by multi-causal and multi-conditional systems” (Coomber 2006, 89).

Second, matters are further complicated by the growing difficulty in ascertaining the relationships among the causal factors, making emerging risk more opaque. This leads to relational complexity when dealing with emerging risk. A recurring theme is the notion that technological advances, combined with the rapid speed with which they are introduced to the market, make it very difficult to evaluate risk.

A third difficulty, and related to these first two, is the potential for cascading effects. This effect was illustrated by the August 2003 power outage that spread across the power grid from Ohio to Maryland, New York and Toronto. The root cause of this mega-outage, the largest in

American history, was determined to be overstressed power lines in Ohio that failed after coming into contact with overgrown trees (Holbrook 2010, 10). In this particular instance, a seemingly simple and innocuous root cause, which should have led only to a minor local outage, was amplified by the complexity of the power grid infrastructure and produced an extreme event.

Under the conditions of today's global environment, with its inherent complexity and continual change, ambiguity and flux have become the new norms. Risk is often opaque, clouded within a complicated web of causal factors and unnoticed until it escalates into a catastrophe. It seems that each day we are faced with new risks accompanied by a corresponding plethora of information about how we can protect ourselves. However, despite the abundance of risk mitigation and risk prevention information, we continue to be impacted by disruptive extreme events. This pattern makes it necessary to question whether traditional risk management approaches, which have tended to be heavily quantitative and predictive, are sufficient for handling post-modern risk including emerging risk. With this in mind, one of the objectives of this paper is to propose an alternative, qualitative framework suited to the challenges of identifying and managing emerging risk.

### ***Defining Emerging Risk***

For the purposes of this paper, emerging risk is defined as a new (novel) manifestation of risk, of a type that has never before been experienced. Novel manifestations of risk include entirely new risk types. For example, it is possible that nanotechnology may represent an area of new risk. As such, it is worth noting here the double-sided nature of science and technology (Beck 2007; Giddens 1990), which not only offers solutions to the problems and challenges of modern life but may contain sources of new (emerging) risk.

In addition, novel manifestations of risk can also include hybrids that blend together known risk types in new ways (combinations), producing outcomes that have not been experienced previously. For example, it could be the case that zoonotic disease in the face of climate change may be an emerging risk.

Although information needed to identify emerging risks may exist, it can often be missed, ignored or downplayed. It is this tendency to overlook, discount or ignore relevant information (including warning signals) that results in “predictable surprises” (Bazerman and Watkins 2004) and partially explains why, following an extreme event, we too often find ourselves wondering why we didn’t see the event coming.

By virtue of its definition, once an emerging risk has evolved through its latency period and has actualized, it ceases to be emerging. This concept, as well as the concept of a “hybrid” emerging risk, can be illustrated by the Sept. 11, 2001, terrorist attacks. Prior to that disaster, large commercial aircraft had never been utilized as weapons of mass destruction against civilian targets. However, the possibility for this type of attack might have been inferred from the use of smaller planes as weapons during the attacks at Pearl Harbor. Furthermore, the tragic events of Sept. 11 were preceded by an unsuccessful attempt to bring down the twin towers on Feb. 26, 1993. Combining these elements, and with the benefit of hindsight, it seems easy to say the possibility for someone to utilize a commercial airliner to inflict critical damage on a skyscraper should not have been “unthinkable” prior to Sept. 11, 2001. Nevertheless, it was widely considered highly improbable for one of the Trade Towers to fully collapse (let alone both of them together) as the result of this type of attack. Regrettably, on Sept. 11, 2001, this emerging risk actualized and now remains etched in our collective awareness.

It should be noted that unlike other types of risk, emerging risk does not have a history of past “comparable” events. As such, emerging risk defies handling through application of traditional risk management methodologies and tools that depend greatly on probabilistic modeling and quantification.

## **Part 2. Literature Review**

This literature review has been divided into four sections. The first section presents perspectives on disaster causation and is followed by a second section containing perspectives on the predictability/preventability of disasters.<sup>1</sup> These topics are presented as a means for understanding the individual, social and systemic factors that give rise to emerging risk and allow it to incubate. The third section of the literature review provides an overview of topics related to cognitive impediments. These materials are intended to be useful in developing an understanding of how and why, at both the individual and organizational level, emerging risks may go unidentified, downplayed and unmanaged. The fourth section of this literature review provides an overview of topics from the management literature (including systems thinking and scenario planning) offered as specific approaches for understanding and managing emerging risk.

### ***Section 1. Causation Perspectives on Disasters***

The literature on disaster causation is very rich, covering a broad range of materials. Within this body of literature, there is considerable discourse on the topic of whether individual or organizational decision-making deficiencies (or a combination of both) contribute to the production of disasters. For example, Bazerman and Watkins (2004, 74) argue that disasters are “predictable surprises,” the byproduct of the following cognitive biases: positive illusions, which

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1. It should be noted here that disasters of purely natural origins have been excluded from this paper, since emerging risk is conceptualized as arising in whole or in part from manmade systems.



give rise to an overly positive view of self, the world and the future; egocentric interpretation of events, a condition in which individual perception is determined by the role one plays; human tendency to overly discount the likelihood and impact of future events; human preference for maintaining status quo, rather than having to deal with the challenges of implementing sometimes unpalatable preventive measures; and human reluctance to invest in preventative measures for problems that do not appear to be vivid and palpable, both personally and immediately relevant. Combined, these cognitive biases can explain why emerging risks may go unnoticed and unaddressed, sometimes escalating into disasters.

Choo (2005, 10) argues that organizational disasters are the cumulative end product of “information failures” at both the individual and organizational level. From this point of view, information failures represent defects in the process of gathering and processing information. Applying this to the phenomenon of emerging risk, information failures represent missed opportunities to identify information that might allow for the pre-emption of emerging risk during its incubation phase.

Much of the scholarly literature that analyzes disasters utilizes a situational approach, focusing exclusively on the causative role of mechanics and human error. A contrasting view (Choo 2005, 8) suggests that disasters incubate within a systemic context and therefore it is insufficient to focus exclusively on human error. From this viewpoint, it appears intuitive that systems thinking can provide insights regarding emerging risk. A systems thinking approach also allows for the acknowledgement of both human error and organizational information impairments as causal factors in disasters.

Turner (1994, 215) suggests the majority of disasters are “social, administrative and managerial” in nature, largely attributable to faulty management systems that foster an

incubation period which precedes organizational disasters. He adds that this incubation period is replete with “misperceptions, misunderstandings and miscommunications [that] accumulate unnoticed” (216), symptomatic of underlying informational and belief defects that work like “pathogens.” These pathogens permeate and infect the entire organizational system until something forces them out in the open, where they can be addressed and removed. For purposes of this paper, it is relevant to inquire about the types of management approaches and structures that might be effective in illuminating emerging risk so that it can be openly addressed and mitigated.

The meta perspective is yet another viewpoint in the literature on disaster causation and suggests that disasters are the byproduct of an interaction among multiple influences at the individual, group and systemic level. Roberto (2002) espouses this perspective, with his conceptualization of disasters as the byproduct of interaction among cognitive, inter-personal (group) and systemic forces that are inseparably intertwined. In synthesizing his perspective of disasters, Roberto draws upon three frameworks: “behavioral decision theory, the team effectiveness literature and complex systems theory” (138). This meta-perspective approach appears to be of particular utility for organizations and executives tasked with making complex and high-stakes decisions about risk management. And, Roberto’s use of complex systems theory suggests this subject area can be of value when seeking to understand the phenomenon of emerging risk.

Weick’s (1995) concept of “sensemaking” offers yet another (holistic) perspective that can be usefully applied to the topics of organizational disasters and emerging risk. As described by Weick, sensemaking consists of environmental and cognitive mapping, carried out in active and reactive ways at both the individual and organizational levels, and involving a process of

putting stimuli into an interpretive framework. Within this interpretive framework, it is not possible to separate individual decision making (sensemaking) from its corollary processes, as they are concurrently carried out at the organizational level. Of particular relevance to the subject of emerging risk, Weick suggests that organizational and individual boundaries/frameworks set the context for decision making and problem resolution and adds that “sensemaking is tested to the extreme when people encounter an event whose occurrence is so implausible that they hesitate to report it for fear they will not be believed” (1). Weick also adds that in such instances, thinking often turns to “it can’t be, therefore, it just isn’t” (1). Combined, these observations suggest particular challenges for the identification and acknowledgement emerging risk, for which there is no historical data and few (if any) historical comparables.

## ***Section 2. Predictability and Preventability Perspectives on Disasters***

The scholarly literature on disaster predication and preventability encompasses a range of divergent perspectives. One viewpoint is that disasters are neither predictable nor preventable. A second perspective is that disasters are both predictable and preventable. A third perspective is a hybrid of these two, suggesting that some (but not all) disasters are predictable and that while they may not all be preventable, their impact can be mitigated. This subject matter is of particular relevance to the understanding and handling of emerging risk, which is characterized by a lack of historical data, and therefore not amenable to traditional predictive modeling tools. The question that arises is what types of alternative approaches might make it possible to envision a range of alternative future outcomes, including types of emerging risk.

Within the literature that positions organizational disasters as predictable and preventable, there exist numerous suggested approaches for avoiding disasters. For example, Choo (2008) argues that an understanding of organizational information impairments, including

“epistemic blind spots, risk denial and structural impediment[s]” (32) is the key to disaster prevention. For purposes of this paper, these information impairments need to be identified, understood and overcome in order to identify and respond to emerging risks.

Bazerman and Watkins (2004, 97) take the position that disaster prevention can be achieved through “information vigilance,” which can be fostered through consistent implementation of four critical “information processing approaches.” These information processing approaches are: environmental scanning, to identify and assess significant threats; integration of information from various sources in the organization, to synthesize actionable insights; timely response to problems and warning signals, with active monitoring of the results and implementation of a “lessons learned” approach to failures, in order to create institutional memory. Each of these approaches can be of great value when seeking to identify and respond to emerging risks.

Clarke and Perrow (1996, 1053) describe organizational disasters as “unique” events, making them difficult (but not impossible) to predict and prevent. They add that organizational disasters tend to be viewed a priori as very low probability, “never” events, noting that this distorted perception may combine with an inflated assessment of organizational capabilities to “normalize danger by allowing organizations ... to claim that ... problems are under control” (1055). This perspective provides insight regarding how and why disasters and emerging risks may be underestimated.

Adding to the discussion of never events, Taleb (2007) presents the notion of the Black Swan as a particular type of disaster, the essential qualities of which are extreme impact, rarity and a low degree of predictability. To the extent that Black Swans fall within the realm of the unpredictable, attempts to predict these events are a waste of time. In describing Black Swans,

Taleb adds that their seminal characteristic is that we behave as though they do not exist. As such, we continue “operating under the false belief that [predictive] tools” (xviii) are capable of accurately predicting uncertainty. Following from these propositions, that which is unknown is much more relevant than that which is known. Applying these concepts to emerging risk, it can be argued that effective management should focus less on predictive efforts and more on alternative approaches which might allow emerging risk to be envisioned and anticipated.

### **Part 3. Cognitive Impediments**

The scholarly literature on cognitive impediments is rich and includes treatment of a range of topics that have implications for risk management decision making and the identification of emerging risk. The body of literature can be more readily understood by dividing it into three groups of thought: works that examine decision making at the individual (micro) level, works that examines decision making at the organizational (macro) level and works that incorporate both of these approaches, taking the position that decision making at the individual and group (social) level are inextricably intertwined.

An understanding of cognitive impediments is an essential building block on the journey to an understanding of emerging risk. Specifically, it is important to understand the impact of cognitive biases, which act to cloud the lens through which information is perceived and filtered. It is of particular note that cognitive biases may produce a distorting effect, one which helps to explain why early warning signals are inexplicably discounted and/or missed (Bazerman and Watkins 2004; Gerstein and Ellsberg 2008) during the incubation period that precedes disasters. Of note, the historical literature has generally approached decision making as a largely linear process. However, it is suggested here that this paradigm no longer fits today’s environment, where complexity and continual change are the norm, rather than the exception.

### ***Cognitive Impediments: Individual***

Historically, much of the literature has been predicated on the assumption that individual decision making is overwhelmingly sound and that manmade disasters are the errant byproduct of deviations from normal rational processes. In contrast, Ariely (2008) suggests our individual decision-making processes are at times heavily influenced by hidden forces of irrationality, making us “predictably irrational.” In particular, Ariely suggests there are several biases that routinely influence our decision making and of which we are woefully unaware. The end product of Ariely’s research is a set of decision-making biases that include: relativity bias (the tendency to avoid comparing things that do not easily lend themselves to comparison); ownership bias (our tendency to favor that which we already have, eschewing the unknown for what is already familiar); loss aversion bias (the tendency to focus on what might be lost, rather than what might be gained); and expectation bias (the tendency of our a priori expectations to taint our views of subsequent events).

As suggested by Roberto (2002), other cognitive biases include overconfidence bias, the tendency to be overconfident in one’s own judgment, and recency effect, the tendency to place greater emphasis on information that is more recent and more readily available. Roberto’s research involved an analysis of the tragic events that unfolded on May 10, 1996, as a group of 23 experienced hikers sought to descend the slopes of Mount Everest following a successful ascent. A storm enveloped the mountain during the descent attempt, contributing to the death of five hikers and creating nearly fatal conditions for those who did survive. The research utilized three conceptual frameworks (team effectiveness theory, behavioral decision theory and complex systems theory) to identify and analyze the factors that contributed to the tragedy and synthesize a set of lessons learned.

From a behavioral decision theory perspective, Roberto concludes the climbers' judgment was likely impaired by several cognitive biases, including overconfidence bias, commitment escalation and recency bias. In this instance, commitment escalation was put into play through the prior tangible and intangible investments (money, physical strain) associated with the ascent. The research findings were that commitment escalation led the climbers to ignore their own prior rules and place themselves in grave danger. The research also found that the hikers' prior successes led them to be overconfident in their judgment, leading them to downplay the severity of the impending weather conditions. It was also concluded that recency bias hindered the judgment of the expedition leaders who had experienced good weather on Everest during the prior recent years. This caused the leaders to underestimate the severity of the storm despite historical data that showed the conditions on May 10, 1996, were anything but abnormal. As a result, the teams did not make adequate preparations for the severe conditions they encountered. Viewed within the context of risk decision making, and with an eye toward the task of understanding emerging risk in particular, this research identifies several impediments that may hamper the ability to anticipate, fully envision, and respond proactively or reactively to risk.

Taleb (2007) adds to the literature on cognitive impediments by noting that the human mind is susceptible to three deficiencies. First, we are prone to suffer from an "illusion of understanding," which is characterized by an unjustifiable belief that we "understand what is going on in a world that is more complicated (or random) than [we] realize" (8). This "illusion of understanding" is the byproduct of a second deficiency, which is our tendency to overvalue factual information and actively seek corroborating evidence, while discounting information that does not fit into our conceptual framework. Third, we are susceptible to "retrospective

distortion,” which is the ability to assess events with clarity only after the fact. The combination of these three deficiencies suggests particular challenges and barriers to overcome when seeking to identify emerging risk.

### ***Cognitive Impediments: Group, Organizational***

This body of literature contains several theories regarding the ways in which optimal decision making may be hindered at both the group and organizational level. The theory of commitment escalation (Staw 1981; Simonson and Staw 1992) describes how an individual’s capacity to withdraw from a losing course of action may be restricted by organizational pressures to attain a particular objective. In so far as additional resources are dedicated to a failing endeavor, the ability to acknowledge and react to emerging risk may be impeded by a reluctance to withdraw from goals and objectives that no longer appear justifiable.

Staw’s (1981) research on commitment escalation involved a systematic review of social psychology literature, with focus on the subject of behavior justification. According to Staw, this literature generally predicts that individuals, when forced to complete unpleasant or dissatisfying tasks in the absence of a reward, will generally positively bias their attitude toward the task so as to justify their prior behavior. In addition to a review of the literature, Staw also conducted a series of three experiments that utilized a self-justification framework to investigate whether decision makers can become overcommitted to a course of action. The underlying hypothesis of the studies was that individuals might go beyond mere passive distortion of adverse consequences to active commitment of new and additional resources in an effort to turn around a failing course of action. As reported by Staw, the results of the experiments were confirmatory and showed that when faced with a failure, subjects invested more resources in that failing



course of action in an effort to recoup the losses/failures. In addition, some subjects reportedly also selectively filtered information so as to maintain their level of commitment.

Staw's subsequent research, conducted with Simonson (1992), was aimed at comparing the efficacy of several de-escalation strategies. This research study was motivated in part by prior research findings (Staw 1976; Tegar 1980; Brockner and Rubin 1985; Fox and Staw 1979) that suggested de-escalation techniques should be based upon reduction of the need for self-justification and external justification. Staw and Simonson's research study involved controlled laboratory experiments with business students as subjects. The 193 participants, who were enrolled in marketing management classes at two California universities, were asked to work on a business case of a company that sold beer in the United States and Europe. Although the company was real, the name was disguised. Students were asked to put themselves in the place of the marketing vice president and submit two recommendations to the company president indicating which of two beer products should receive extra funding. Following submission of their recommendation, each student-participant was given negative feedback in the form of disappointing results, and asked to make another funding allocation decision. These research findings were confirmatory of the prior research and demonstrated that individuals responsible for an initial allocation decision invested more subsequently than those who had not made a prior investment commitment.

In their research on the subject of organizational failure, Clark and Perrow (1996) suggest that over time, organizations tend to increasingly believe their own representations of reality, even in the face of information that suggests these representations are incorrect. Using an illustrative case study of the Shoreham Nuclear Power Station in Long Island, N.Y., Clark and Perrow focus in particular on the role of "fantasy documents" (1040) that set forth the

organization's plans for responding to highly improbable events such as the chemical accidents in Bhopal, India, the Exxon Valdez accident and the Three Mile Island nuclear accident. Clark and Perrow's research carefully examines the evacuations plans for the Shoreham facility, including a series of related evacuation exercises (drills) conducted during 1986. The chronology of events, along with analysis of documentation related to the evacuations exercises, is used by Clark and Perrow to illustrate the dynamics of organizational failures and the characteristics of fantasy plans. The researchers note that accident/disaster "fantasy plans" tend to be premised upon unrealistic views of organizational capabilities and also upon the premise that "everything will work right the first time, that every contingency is known and prepared for" (1041). As such, Clark and Perrow's research demonstrates how organizational representations of reality may serve as cognitive impediments that obstruct optimal decision making.

Subsequent research by Bonabeau (2007) further highlights the role played by unrealistic views of organizational capabilities. Specifically, Bonabeau notes that organizations may be inherently less adept at identifying their own (internal) vulnerabilities. This weakness suggests a potential gap in the ability of organizations to effectively conduct thorough risk analysis, which necessarily must include assessment of endogenous risk.

Groupthink theory (Janis 1972, 1982) offers another perspective on sub-optimal decision making at the group level. As described by Janis (1972), groupthink occurs when conformity pressures of the group lead to faulty decisions, made in an effort to preserve group harmony. This premature concurrence seeking, where normative pressure impedes effective assessment of alternative courses of action (Robins 1998), leads to deterioration in "mental efficiency and reality testing" (Janis 1972, 9). Groupthink produces defective decision making characterized by the following attributes: poor information searching, selective bias in information processing,

incomplete surveying of objectives and alternatives, failure to re-examine choices and rejected alternatives, and failure to develop contingency plans (Janis and Manning 1977, 132). In so far as groupthink constitutes “a disease of insufficient search for information, alternatives and modes of failure” (McCauley 1998, 144), the consequences of groupthink may be particularly negative for groups carrying out risk management activities aimed at identifying sources of risk and potential mitigation approaches.

The case study research done by Janis (1972) examined groups consisting of government and public officials charged with making critical policy decisions (e.g., the Bay of Pigs decision) at the national level. Janis’ research was carried out through interviews of the group participants, as well as through review and evaluation of written records of the group meetings. The research findings included (10) the determination that groupthink is “most likely to occur” in the presence of three antecedent conditions (independent variables). The three conditions are: group cohesiveness, insulation of the group from outside information sources and limiting influence of a group leader who advocates his own, preferred decision. In so far as these conditions foster groupthink dynamics, it is possible to suggest alternatives that could serve to reduce the likelihood of groupthink and as such may be beneficial in situations outside the political decision-making realm Janis studied. Such alternatives include: use of group-building approaches that emphasize diversity and minimize propensity for cohesiveness; inclusion of outside sources of information, including a discordant voice that can challenge group cohesion and introduce nonconforming perspectives; and selection of group leaders who do not have an agenda to promote and are adept at fostering the identification and candid evaluation of competing alternatives.

Subsequent experimental research by Flowers (1977) validated Janis' hypothesis that when faced with a crisis problem, open group leaders produce a larger number of potential solutions. Flowers' research sought to test, in a laboratory setting, the effects of leadership style on decision making in crisis situations. The experimental design involved use of a laboratory simulation involving groups of college students given a crisis problem to solve. While half of the groups were assigned to directive (closed) leaders, the other half were assigned to nondirective (open) leaders. Analysis of variance (ANOVA) examination of the study data showed that open leaders produced significantly more ( $p < .05$ ) solution options than did closed-style leaders.

#### **Part 4. Management Literature**

##### ***Complexity Theory***

Complexity theory utilizes an integrative approach that draws from several bodies of literature (including chaos theory, systems theory and cognitive psychology) to offer a means for explaining systems and phenomena that defy explanation through more traditional mechanistic and linear theories. It is possible to view many systems, including risk generating systems, from a complexity perspective.

A complex system is one that contains a large number of constituent parts, is networked and has the capacity to follow more than one pathway. Thus, it has more than one potential future endpoint (Allen 2000; Yilmaz and Gunel 2009). It is possible to conceptualize a complex system in terms of the types of complexity it embodies. As described in the literature, there are two primary types of complexity: relational complexity and cognitive complexity. Richardson, Cilliers and Lissack (2001) posit that relational complexity is generated as the outcome of conditions where there are a large number of operational factors. Child and Rodrigues (2008) suggest that cognitive complexity is produced by an increase in the quantity of information

within the system. They further add that under conditions of cognitive complexity, it becomes more difficult to identify and process relevant information.

Complexity itself can be further understood through examination of its constituent elements and consequences. A large number of operative factors produce relational complexity, which makes it more difficult to ascertain cause-and-effect relationships (Richardson, Cilliers and Lissack 2001). Where the quantity of information increases, cognitive complexity is the byproduct. Under these conditions, it becomes more difficult to identify and process relevant information (Child and Rodrigues 2008).

Despite a solid body of literature on the subjects of systems thinking and complexity, there is comparatively little work that applies a systems thinking and complexity approach to the subject of risk management. White (1995) and Bonabeau (2007) are among the few authors who adopt this focus and, as such, there remains a gap in the scholarly literature.

With regard to complexity and risk, it has been noted that increased complexity brings with it a greater range of things that can go wrong. This in turn increases the potential for random failure (Bonabeau 2007). In addition, within highly complex and large systems, small events can amplify into catastrophic ones. Complexity thereby magnifies risk through a combination of wider sources and greater severity, including the potential for cascade effects.

In addition, complexity has been characterized by some as a source of inevitable risk. This perspective is typified by Perrow's (1999) normal accident theory, which proposes that major accidents become inevitable (normal) as system complexity and interconnectedness increase.

## *Systems Thinking*

Most traditional risk analysis tools—for example, root cause analysis and Pareto diagrams — rely upon a reductionist approach and are premised upon the notion that understanding of an end event (outcome) can be derived by working backwards and breaking the event down into its constituent parts. A critical limitation of this approach is that it does not capture the essence of emerging risk as dynamic, the byproduct of evolving, complex and systemic factors influenced by human behavior. When examining dynamic risk, it is necessary to understand that the outcome (event) may be greater than the sum of its constituent elements. This concept is captured eloquently by Grobstein (2007, 302), who notes, “Simple things interacting in simple ways can yield surprisingly complex outcomes.” Thus, to understand dynamic risk, it becomes necessary to work “both downward and upward” (Grobstein 2007) to capture not only the constituent elements of risk, but also the complexity generated by their dynamic interactions.

By removing artificial barriers between constituent parts of a system (Fulmer 1992), systems thinking is a valuable tool in overcoming the limitations of certain traditional risk analysis tools. This concept is especially important in exploring emerging risk, where answers and solutions can be uncovered only through an understanding of dynamic interactions and by seeing both the operative elements and their interactions in uncustomary ways. Applied in this manner, systems thinking represents a specific cognitive competency (Boyatzis 2006) relevant to the identification and handling of emerging risk in an environment characterized by high relational complexity. And, with its emphasis on inter-connections, patterns and relationships (Senge 1994; Sornette 2009), systems thinking provides a framework for achieving enhanced understanding of the dynamic and interconnected nature of the complex breakdowns increasingly dotting the landscape of modern risk management. Of particular note, a systems thinking

approach shifts focus away from the “constant attributes” (Katz and Kahn 1978) of objects, and instead emphasizes connections and interdependence. This provides a means for understanding the dynamic and evolving nature of complex events, including emerging risk.

### ***Scenario Planning***

According to Chermack (2004, 302), scenario planning can be conceptualized as a process that develops “several informed, plausible and imagined alternative future environments in which decisions about the future may be played out, for the purpose of changing current thinking, improving decision making, enhancing human and organization learning and improving performance.” While definitions of scenario planning vary across the literature, a recurring theme is the utility of scenario planning as a tool for optimizing organizational decision making.

The scenario planning process is concerned with the identification of causality (Wright and Goodwin 2009) and strives to capture “the range of uncertainty thought to be present” (O’Brien 2004, 709). As such, scenario planning offers a viable means for examining emerging risk, which emerges from a web of interconnections and is characterized by a high degree of uncertainty.

### ***Scenarios***

Although the literature contains a large number of definitions and descriptions for the term scenario, there are two descriptions particularly useful for this discussion since they suggest ways in which scenarios might aid the process of identifying emerging risk. One description is that of scenarios as “purposeful stories about how the contextual environment could unfold in time” (Burt et al. 2006, 60). Building upon this understanding, Schwartz (1991, 4) adds that scenarios provide “plausible alternative stories about the future ... which [may be] used as building blocks for designing strategic conversations.” In this way, scenarios function as “tool[s]

for ordering one's perceptions about alternative future environments in which one's decisions might be played out" (Schwartz 1991, 4). Of particular note, scenarios are not merely forecasts, predictions or extrapolations (Postma and Liebl 2005; Wright and Goodwin 2009), which would make them more akin to traditional risk management tools such as predictive modeling. Rather, scenarios seek to "uncover ... the causal nature of the unfolding future" (Wright and Goodwin 2009, 817) and as such can provide insight with regard to emerging risk, which is dynamic and uncertain in nature.

### *Utility and Benefits of Scenario Planning*

One potential benefit (Chermack 2004) in utilizing scenario planning is the potential for reducing bounded rationality. This beneficial outcome is achieved when scenarios encapsulate a great amount of information into the package of a story that is both "conversational and narrative," making key points and qualities easy to remember (Chermack 2004, 303). This is significant, since research suggests information that is memorable is more likely to be recalled and, therefore, more likely to be acted upon (Schwartz 1991; Swap et al. 2001; van der Heijden 1997). It is suggested here that this particular quality of scenarios can enhance the process of identifying emerging risk by mitigating the effects of certain cognitive impediments, including recency effect.

Another benefit of scenario planning is its utility in overcoming "strategic inertia" (Wright et al. 2008, 221). This outcome is achieved through the process of exploring a range of alternative, potential future outcomes, which includes expressions of "dissenting opinions" (221) that do not conform to organizational norms. In this way, scenario planning can function as a "jolt" to the organization" (227), allowing the organization to rethink its business plans and



assumptions. Non-conforming perspectives can be of particular benefit in overcoming cognitive impediments that can hinder the identification and management of emerging risk.

An additional benefit to be derived from scenario planning lies in its use of “intuitive logics” (Wright and Goodwin 2009, 816) as an alternative means for addressing situations of low predictability where tools of estimation are ineffective. By obviating the need to make predictions, scenario planning can be of particular utility as a means for handling “unique, unprecedented and rare events” (816), including emerging risk.

### *Potential Limitations of Scenario Planning*

If scenario planning is to be utilized as a tool for managing emerging risk, it is important to understand not only the benefits of scenario planning, but also the potential limitations of this approach. One limitation is that when groups or individuals imagine a sequence of events, the imagined sequence of events may be perceived by that group as more likely to occur (Wright and Goodwin 2009). In addition, where events are linked in a causal chain, the point of intersection may be viewed as more likely (Wright and Goodwin 2009). Consequently, the very process of scenario construction might produce inappropriately heightened confidence in one’s ability to anticipate the future (Wright and Goodwin 2009; Kuhn and Sniezek 1996). One means for effectively challenging the limitations of bounded thinking is by asking scenario planning participants to assume that the worst case event has already taken place and then to consider what caused the event (Wright and Goodwin 2009). This approach is supported by the research of Mitchell, Russo and Pennington (1989), which argues that backward-looking approaches will yield more causes for the worst-case event.

Another possible limitation of scenario planning stems from its concern with causality. That is, in so far as scenario planning has its roots in the existing mental models of the

participants (Wright and Goodwin 2009; O'Brien 2004) and focuses on causality, scenario outcomes may be incapable of capturing possible future end points (outcomes) not linked to events in the present (Wright and Goodwin 2009). One approach to overcoming these limitations may be through the inclusion of people who hold non-conforming, dissenting views on key uncertainties (Wright and Goodwin 2009).

### ***Chaos Theory***

In its broadest sense, chaos theory may be understood as the study of nonlinear dynamic systems (Levy 1994). Its origins are frequently traced to Lorenz's work in the area of turbulent flow dynamics in fluids, with subsequent applications in an array of other disciplines including mathematics, physics, psychology (Guo et al. 2009) and business strategy (Levy 1994). It has been suggested (Levy 1994; Katz and Kahn 1978) that chaos theory may be best viewed as an extension of systems theory rather than as a novel paradigm.

Chaos theory has been a productive means for exploring systems that are complex, unpredictable and irregular as well as for the exploration of chaotic systems characterized (Guo et al. 2009) as nonlinear, dynamic and deterministic. Applied for these purposes to the problem of emerging risk, chaos theory can help to fill the gap in understanding left by traditional linear approaches, with their emphasis on stability and predictability. Particularly meaningful application of chaos theory can be found in the realm of social science, where outcomes often are the product of multiple, highly complex underlying interactions (Levy 1994). This suggests further utility of chaos theory as a means for understanding emerging risk, especially in nonlinear systems where small inputs may produce large effects and large inputs may produce minimal effects.

### ***Strategic Foresight, Anticipatory Management and Futurist Thinking***

Anticipatory management is premised upon the notion that change management has become an essential business competency in today's environment where failure to anticipate change can be fatal (Ashley and Morrison 1997). Viewed collectively, the body of literature on strategic foresight and anticipatory management suggests approaches for intelligence gathering, designed to enable organizations to not only survive the pressures of change, but to derive competitive advantage. Each of these approaches constitutes a tool that can assist in closing the gap between what is known and what needs to be known in order to reduce the uncertainty surrounding the achievement of business objectives. Applied to the identification of emerging risk, each of these tools helps to close the gap between anticipated risks and the full spectrum of possible risks.

A theme within the body of literature on anticipatory management is the notion that environmental scanning should be utilized to identify "signals of change" (Ashley and Morrison 1997) emanating from a spectrum of potential sources in the macro environment. These sources may include social, technological and environmental developments that emit "weak signals" (Ansoff 1975; Rohrbeck and Gemünden 2008) which can serve as leading indicators of developing change in the macro environment. Of particular value are "signals from the periphery" (Haeckel 2004, 182), which rest outside our customary focus or field of vision. By learning to successfully scan at the periphery (Day and Schoemaker 2006), organizations can become adept at identifying potential sources of emerging risk.

It is suggested here that scenario planning, which customarily begins by taking a broad spectrum view in order to recognize "trends and uncertainties that have the ability to transform the environment" (Day and Schoemaker 2004, 135), can be used as an approach for enhancing

the process of environmental scanning. This tandem approach of scenario planning in conjunction with environmental scanning can help organizations broaden their perspective with regard to emerging risk while keeping them from being overwhelmed by an array of irrelevant signals. These approaches can be combined with strategic foresight, which seeks to identify “new and emerging issues for which often no past data is available and therefore forecasting would not be possible” (Rohrbeck and Gemünden 2008, 11). Since emerging risk is characterized by a lack of past data, and defies predictive modeling and forecasting, it appears intuitive that strategic foresight approaches can be of utility in addressing the challenges of emerging risk.

## **Part 5. Proposed Framework for Managing Emerging Risk**

As discussed above, emerging risk presents a special set of challenges for organizations as they strive to effectively understand and manage their overall risk portfolio. From a practitioner standpoint, one particular challenge is how to deploy the set of tools and approaches needed to manage emerging risk. One possible solution, which will be discussed in the remainder of this paper, involves embedding the management of emerging risk into a holistic enterprise risk management framework. This innovative approach offers one means for operationalizing the concepts suggested in this paper as relevant to the management of emerging risk. An illustration of the proposed innovative ERM framework is contained in Figure 1.

### ***Pillar 1: Risk Management Process***

As depicted in Figure 1, the proposed holistic, innovative ERM framework consists of three pillars, each of which represents a dimension of ERM. At the center of the framework, and labeled Pillar 1, is the risk management process, an adaptation of the ISO 31000 (2009) risk management process. The purpose of the risk management process is to provide a consistent and

repeatable series of steps that can be carried out by organizations for the purpose of identifying and identifying risks, as well as for determining appropriate risk treatments and monitoring/reporting on the outcomes of those risk treatment choices. The second step of the risk management process is risk assessment and has traditionally involved identification of possible risks, along with their probability and severity. It is this step in the risk management process, and particularly the identification of potential risks, that ties directly to the management of emerging risk.

### ***Pillar 2: Organizational Processes***

Four distinct organizational processes are depicted at the left side of Figure 1, and consist of scenario planning, anticipatory management, strategic foresight and environmental scanning. As described in this paper, each of these processes can be implemented as a means for identifying any emerging risks. When these processes are incorporated into an ERM framework, they move from being stand-alone activities within the organization, to become ERM processes with special utility for addressing the challenges of emerging risk. Moreover, through this linkage of organizational process and ERM infrastructure, there is a means for synergistically integrating ERM with activities that deliver value for the organization. One of these value-adding activities, then, becomes the enhanced capacity to identify the full range of risks (including emerging risks) faced by the organization.

Within the proposed ERM framework, scenario planning is conceptualized as a process that aims at developing alternative, informed notions of the future environment (Chermack 2004; Schwartz 1991), including an understanding of how emerging risks might evolve over time. Each scenario developed serves as a tool that can enhance organizational learning and improve decision making by challenging status quo thinking (Chermack 2004), including conceptual

limitations that might lead to the exclusion of emerging risks. As positioned within the organizational process portion of the ERM framework, scenario planning provides a tool for organizations to better conceptualize both upside and downside risk as it relates to the uncertainty surrounding strategic plans. This linkage of scenario planning to ERM creates a structure for organizations to reduce downside risk and capture upside risk by developing alternative strategic plans. This in turn creates resilience by positioning the organization to change direction in the face of environmental uncertainty, including the uncertainty of emerging risks that might actualize over time.

Anticipatory management and strategic foresight, as conceptualized within the proposed ERM framework, are closely related to scenario planning in so far as they serve as approaches for closing the gap between what is currently known and what needs to be known for an organization to attain long-term success. This includes closing the knowledge gap related to emerging risks that could evolve into disasters capable of threatening the attainment of organizational objectives.

As conceptualized here, environmental scanning is a process for detecting early signals of change that serve to forebode risk sources for the future, including sources of emerging risk. Combined and positioned in this manner, the tools of scenario planning—anticipatory management, strategic foresight and environmental scanning—provide a means for operationalizing ERM, keeping ERM frameworks both meaningful and current in today’s dynamic and rapidly evolving business environment.

### ***Pillar 3: Organizational Architecture***

Organizational architecture is depicted at the right side of Figure 1, and is comprised of corporate social responsibility (CSR), corporate sustainability (CS), corporate strategy and

corporate governance. As conceptualized in the proposed framework, CSR and CS are aimed at ensuring current organizational objectives are not achieved by compromising the organization's long-term success, or at the expense of society overall. Embedding CSR and CS into the proposed ERM framework provides a specific and measurable means for exploring and weighing the risks (including sustainability risks) associated with the organization's strategy. In addition, this approach provides a means for considering emerging risk as part of the organization's overall approach to CSR and CS.

Within the proposed ERM framework, corporate strategy is conceptualized as the outcome of the strategic planning process, involving deliberate articulation of the organization's mission, taking into consideration external threats and opportunities, and determining appropriate actions to be taken in furtherance of the organization's chosen mission. Where ERM is linked with corporate strategy and strategic planning, enterprise risk can be understood (Dickinson 2001, 361) as "the extent to which the outcomes from the corporate strategy of a company may differ from those specified in its corporate objectives, or the extent to which [the organization] fails to meet these objectives (using a 'downside risk' measure)." And, with a scenario planning approach included as part of the ERM process framework, it becomes possible to examine emerging risks that could evolve in ways that might threaten the achievement of corporate strategic objectives.

Finally, corporate governance is presented in the ERM framework as a component of organizational architecture. As conceptualized here, corporate governance represents the set of practices and responsibilities exercised by an organization's board of directors and executive leadership to provide strategic direction and in furtherance of attaining strategic objectives. When ERM is linked to corporate governance, as in the proposed ERM framework, there is a

seamless infrastructure for articulating enterprise level risks (including emerging risks) and ensuring that organizational resources are deployed so as to minimize downside risk while furthering the attainment of strategic objectives. The linkage of ERM and corporate governance also provides the structure required to ensure that ERM is appropriately situated as a function driven by the organization's board and executive leadership. Collectively, CSR, CS, corporate governance and corporate strategic plans provide means for assessing the success of ERM, which is measured in terms of the organization's attainment of objectives in each of these areas.



## **Conclusion and Suggestions for Further Research**

In this paper, an innovative approach has been used to address the challenges of emerging risk by operationalizing a set of tools and approaches positioned within an ERM framework. The proposed framework incorporates three pillars of ERM, which are the risk management process, selected organizational processes (scenario planning, anticipatory management, strategic foresight and environmental scanning) and selected organizational architecture (CS, CSR, corporate governance and corporate strategy).

Possible future research might include case studies to evaluate the utility of the proposed framework for those organizations choosing to implement ERM. In this regard, it is noted here that although ERM frameworks may be meaningful from a theory perspective, they are of little practical value if they cannot be deployed within organizations. Further research might also include discussion of how emerging risk can be addressed within organizations that do not implement ERM. This is an important area for further research, since many organizations either choose not to implement ERM or do so in a limited way.

This said, it should be remembered that risk management and ERM are as much art as they are science. As such, new limitations and constraints are likely to be identified in the future, as the state of practice and theory continue to evolve. With that in mind, the framework contained in this paper is not intended to be the right answer but instead a means for evolving toward less wrong approaches.

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**Figure 1**  
**Proposed Innovative Framework**

