The current issue and full text archive of this journal is available at
www.emeraldinsight.com/0025-1747.htm

Crisis management or crisis response system?

A complexity science approach to organizational crises

Alexandros Paraskevas
Department of Hospitality, Leisure and Tourism Management, Business School, Oxford Brookes University, Oxford, UK

Abstract

Purpose – To offer a complexity-informed framework for the design of an effective organizational crisis response system.

Design/methodology/approach – A narrative analysis of the crisis response in a hotel chain facing a major food poisoning outbreak, seen from a complexity theory perspective. Data were collected through 17 in-depth interviews of persons involved in the crisis response and through analysis of secondary data.

Findings – The analysis identified weaknesses in the chain's crisis response and complexity theory provided a good theoretical foundation of the proposals to overcome them.

Practical implications – Organizations should redefine the role of crisis management plans and crisis management teams. An effective crisis response should be viewed as a living (co-evolving) system within the organization. By adopting complexity principles the organization can make this system far more effective.

Originality/value – The paper is among the very few that deal with crisis management from a complexity perspective.

Keywords Chaos theory, Hotel and catering industry

Paper type Research paper

Introduction

Complexity thinking is not new to organizational and business studies (a thorough literature review of the 1980s and the 1990s on complexity in management is offered by Maguire and McKelvey, 1999). Although there is no universal definition of what complexity science is, its principles have inspired many academics and practitioners in the field of business management and provided them with useful explanatory frameworks to understand the behaviour of organizations as complex systems (Mitleton-Kelly, 2004). The published research on complexity applications in business remains at a predominantly conceptual level (as the field is still in development) whereas increasing empirical research covers applications in specific sectors like healthcare organizations (Plsek and Wilson, 2001; Redfern and Christian, 2003; Begun *et al.*, 2003) or management topics such as change management (for example, Beeson and Davis, 2000; Styhre, 2002; Smith, 2004, McMillan, 2005), organizational learning, innovation and knowledge management (Fonseca, 2001; Hall and Andriani, 2003; Harkema, 2003), supply chains and logistics (Wilding, 1998; Goldsmith *et al.*, 2002), small business management (Fuller and Lewis, 2002; Mole, 2004), etc. One topic that has hitherto received little attention is the response to crisis situations. In the substantial crisis management (CM) literature there are only a few authors that use

Management Decision
Vol. 44 No. 7, 2006
pp. 892-907
© Emerald Group Publishing Limited
0025-1747
DOI 10.1108/00251740610680587

principles of complexity and chaos theories in their work but even they do not deal with organizational crises but with natural disasters (for example, Comfort, 1999), crisis communications (Murphy, 1996; Seeger, 2002) and marine accidents (Goulielmos, 2004). This paper aims to propose a complexity-informed framework for effective organizational crisis response.

Crises and crisis management

The word crisis originates from the Greek word "*krisis*", which means judgement, choice or decision. The use of the term, however, varies depending on the context in which it is being used and the researcher's discipline (Preble, 1997). In the organizational literature, crisis is defined as follows:

> An organizational crisis is a low-probability, high-impact event that threatens the viability of the organization and is characterized by ambiguity of cause, effect, and means of resolution, as well as by a belief that decisions must be made swiftly. (Pearson and Clair, 1998, p. 60)

Fink (1986, p. 15) suggests that planning for a crisis " . . . is the art of removing much of the risk and uncertainty to allow you to achieve more control over your own destiny". Although this view is almost 20 years old, it reflects the current management approach to dealing with crises, which sees them as isolated events that can be analysed in terms of causes, consequences, caution and coping, where: causes "include the immediate failures that triggered the crisis, and the antecedent conditions that allowed failures to occur" (Shrivastava, 1993, p. 30); consequences are the immediate and long-term impacts; caution includes the measures taken to prevent or minimize the impact of a potential crisis, and coping comprises measures taken to respond to a crisis that has already occurred.

According to Fink (1986, p. 20-28), a crisis can consist of as many as four different and distinct stages:

(1) prodromal crisis stage;

(2) acute crisis stage;

(3) chronic crisis stage; and

(4) crisis resolution stage.

Effective crisis planning aims at identifying the early warning signals for the crisis, even if occasionally the prodrome may be oblique and much harder to recognize, or is evident but no action is taken. Once the organization has passed from the prodromal to the acute crisis stage, management can rarely recover the lost ground and the crisis will start causing damage, the extent of which depends on the preparedness of the organization and the effectiveness of its crisis response. The chronic crisis stage is sometimes called the "clean-up" stage of a crisis situation, when the organization tries to recover from the crisis, identify its vulnerabilities and learn from the failures and successes of its response. Finally, the crisis resolution stage is when the organization comes back to normality and resumes full functionality.

This analysis can be used to formulate a crisis management plan (CMP) that "consists of a full range of thoughtful processes and steps that anticipate the complex nature of crises" (Caywood and Stocker, 1993, p. 411) and is built upon rational expectations about how a crisis will manifest itself and how the organization will respond to it. It is these rational expectations that are precisely the weakness of this approach as crises increasingly become complex in nature, transboundary and

interconnected (Boin and Lagadec, 2000). Their impact is not confined to the organization where the crisis manifests itself but has repercussions to all organizations that are connected with it, most probably with an amplifying effect.

A growing body of scholars call for a new approach to crisis management. Seeger *et al.* (1998) call for a "macroscopic investigation of organizational crisis" and indicate the suitability of non-linear dynamics towards this end citing Murphy (1996) who suggests that non-linear dynamics should be used as the means to monitor the evolution of interest groups, crises, and rumours. Robert and Lajtha (2002) contend that the key to effective crisis management lies with structured and continuous learning processes that equip managers to deal with the sudden and the unexpected rather than with detailed CMPs. Lagadec (2004, p. 160) in his analysis of the French 2003 heat wave experience calls "to switch from a mechanical or an architectural to a more "biological" approach to read, seize, and handle emerging crises".

The complexity science lens

In today's dynamic, high-velocity social and business environment, which is characterized by discontinuity and continuous change, crises are understood as more the norm rather than exception in organizations. Managers increasingly realize " ... that anytime you are not in a crisis, you are instead in a pre-crisis, or a prodromal mode" (Fink, 1986:5). At this prodromal stage, there may be some small perturbations in the internal and the external organizational environment, which Prigogine and Stengers (1984) call "fluxes". These constitute one or more "issues" for the organization and are the triggers that according to Mitroff (1988) always give early warning signals. If the initial conditions (i.e. the basic resources available for issue detection and action, as well as the current operating context of the organization) allow it, these issues may be gradually amplified to a crisis. As the intensity of these issues increase, the organization is brought farther from equilibrium, the situation moves towards the acute crisis stage and some disorder (instability) within the organization appears. However, at these stages of the crisis the organization structures hold the organization together and dissipate the "fluxes of energy" coming into it. Prigogine (1989) calls this property of the system "dissipative structure" and characterizes it as "island of order in a sea of disorder, maintaining and even increasing its order at the expense of greater disorder in its environment".

At a certain point of time in the acute stage, the crisis erupts as a "strange attractor" – a magnet with unfathomable properties that draws the organization in a particular direction (Pascale *et al.*, 2000) – and the behaviour of the organization changes since the control parameters have changed and it is operating under a different set of governing principles. At this point, the organization reaches the threshold of "critical instability", also called "bifurcation point" or "phase transition", where the dissipative structure may either break down leading to the demise of the organization or break through to one of several new states of order (completely new status of the organization), which will emerge from the self-organization (spontaneous reallocation of energy and action) of the organization's components or "agents" (Kauffman, 1993). A key principle behind this self-organization is that it is done in response to each agent's perception of the situation rather than through some central controlling mechanism. What exactly happens at the bifurcation point depends on the organization's previous history. Depending on the path it has taken to reach the point of critical instability (i.e. the way it has dealt with the crisis at its early stages and its crisis preparedness levels),

it will follow one or another of the available branches after the bifurcation. At this point, the organization begins to display new "emergent" properties, i.e. its components take on properties that none of them had before (Waldrop, 1992, p. 82). The crisis moves to the chronic stage and the "emergent" organization is a completely new one. Should the process of self-organization be successful, the crisis moves to the resolution stage and the organization to "business as usual". The experience of the organization from this crisis will become part of its organizational learning and its history and will influence its future behaviours. This complex business behaviour, displayed by organizations during and after a crisis, has been documented by several authors (Richardson, 1994; Comfort, 1999; Sellnow *et al.*, 2002; Torrieri *et al.*, 2002).

Seen from a complexity science perspective, it can be easily understood why the traditional approach to crisis response through very linear cause-and-effect CMPs is ineffective. To start with, the organization as a complex system is sensitive to initial conditions, unpredictable and consequently efficiency would normally one of its emergent properties and not an outcome of a linear cause-and-effect crisis planning approach. The second point to be made is that, due to continuous change in both the internal and the external organizational environment, the initial conditions of a crisis constantly change with significant effects on the organization's fitness landscape[1]. Crisis plans designed for certain conditions will become ineffective under some other conditions, since they are usually too rigid and fail to adapt to higher performance levels on the organization's current or emergent fitness landscape.

Crisis response itself can be viewed as a complex system (which is a sub-system of the organization) with fuzzy boundaries and diverse agents who come from several different parts of the organization and serve one or more crisis response tasks: signal detection, prevention, damage limitation, recovery, learning and redesign (Mitroff, 2005). The system is able to learn from its environment and change its internal structure and organisation over time, thus changing the behaviour of individual elements. It can therefore be considered as an evolutionary complex system (Allen, 1994), a local optimum[2] which evolves, "hill-climbing" in its relevant environments. The system does not evolve in a vacuum but it influences the other organizational subsystems and the external environment, and in complexity terms, when it moves along its fitness landscape, it alters the fitness landscape of other systems (Kauffman, 1995, pp. 215-224) fitting the description of what Mitleton-Kelly (2004) defines as a complex co-evolving system (CCES). Crisis planning, in this light, simply defines the rules of the system's agent interactions, the "selection environment" (Lewin and Volberda, 1999) in which its agents operate.

Research design

As stated in the introduction, this paper aims to propose a complexity-informed framework for effective crisis response. To achieve this aim, the researcher took the case study approach which would offer a rich, holistic and in-depth understanding of an organizational crisis context and the crisis response processes followed before, during and in the aftermath of the crisis. Several authors (Feagin *et al.*, 1991; Yin, 1993) contend that in this type of explanatory research the case study approach is ideal. Robson (1993, p. 44) suggests that the case study approach has considerable ability to generate answers to the question "why?" as well as the "what?" and "how?" questions. In this process of "explanation building" (Yin, 1994) the researcher does not start out with a theory to be investigated. Rather, the researcher attempts to induce theory from

case data while collecting and analysing them by stipulating a set of explanations, causal links and trying to "explain the phenomenon" (Yin, 1994; Audet and d'Amboise, 2001). The case of a hotel chain faced with a major crisis during the summer of 1993 was chosen for investigation. The data were collected through:

- a formal set of interviews with the CEO and managers involved in the response to this crisis;
- a video recording of the crisis response evaluation at an executive committee meeting; and
- a review of the CMP that was implemented during the crisis.

Due to the sensitivity of the case all information was kept confidential, anonymity has been maintained and every reasonable effort was made to adequately "disguise" the hotel chain. Access to all managers involved in was granted by the chain's CEO. However, due to various reasons, 16 overall interviews were conducted with general managers, marketing and/or operations managers of eight out of the 13 units involved. The interviews involved an in-depth one-to-one discussion between the manager and the researcher and lasted from 50 to 95 minutes. The respondents were encouraged to recall the events associated with the crisis and evaluate the overall organization's response to it from their own perspective. This is a quite common approach in complexity research (Hatch and Tsoukas, 1997; Luhman and Boje, 2001; Stacey, 2001; Mitleton-Kelly, 2005) and in this study has allowed the documentation of a first-person account -a narrative- by respondents of their experience in relation to this crisis offering a rich perspective, holistic, and dynamic view. The interviews were audio-taped and later fully transcribed. The analysis of each narrative enabled the researcher to see how respondents imposed their order on experience and environment by commenting upon their relationships between events and actions (Polkinghorne, 1988). By comparing and combining the responses, the researcher was provided with "a lens through which the apparently independent and disconnected elements of existence are seen as related parts of a whole" (Polkinghorne, 1988, p. 36) and make connections with principles of complexity theory. Although a frequent criticism of case study research is that the results are not generalizable, the fact that this study uses a well-established theory "as a template against which to compare the empirical results of the case study" allows what Yin (1994, p. 21) defines as "analytic generalization".

The case

The investigation of the crisis response was conducted in a hotel chain with (at the time of the investigation) 19 properties, eight five-star city hotels and 11 four and five-star resorts all operating in one Mediterranean country. The hotel chain has been operating for over twenty years and through a successful expansion programme, mainly management contracts, has become one of the most important players in its national tourism industry. This expansion could not have been as successful without very detailed standard operating procedures for every aspect of hotel operations including the supply chain management, food storage, preparation and service. The chain's religious adherence to these standards has given it the leading position in the market and a huge brand equity as the chain's name is associated with top quality hospitality products and services.

All procurement activities are conducted by the headquarters, based in the capital of the country, and supplies – including fresh produce – are shipped daily to all

properties through the chain's proprietary logistics unit. The chain has incorporated the Hazard Analysis and Critical Control Points (HACCP) principles in every phase of food production (from supply to service) and has an ISO9002 and a HACCP certification by a major European testing and certification agency. After 9/11, the chain has developed detailed CMPs covering specific scenarios: terrorist attack, natural disaster, epidemic, political and social unrest and "major product failure". The latter deals with potential cases of massive customer relationship breakdown caused by an event/accident for which the chain (or its employees) is fully responsible. These, combined with an excellent media relations programme which has been developed over the several years of its operation, give the hotel chain the confidence that its brand equity will suffer little damage even at the worst case scenario.

On Monday 14 July 2003 the headquarters of the chain issued a "red alert" after receiving messages throughout the weekend of several incidents of foodbourne illness in six city and seven resort properties. The numbers of reported cases were increasing exponentially and it was obvious that the chain was faced with a major crisis. A CM cell (team for the co-ordination of the crisis response) was swiftly set-up in the chain's headquarters and headed by the CEO asked the properties to implement the CMP for major product failure. Management at unit level should seek medical support and treatment for the infected guests from the locally contracted doctors, make sure that severe cases are immediately hospitalised and start preliminary investigation collecting data on symptoms and food consumption histories of the infected guests. Two crisis task force (CTF) teams of executive managers were assembled in the headquarters with the aim to visit all infected units and deal with key account customers. The teams would meet the tour leaders of key account tour operators' groups with infected guests and deal with the situation on a guest-to-guest basis. The CTFs started with the properties nearer to the headquarters, the one gradually moving ("like a wave") to the north and the other to the south of the country. At the same time the media relations team was making sure that there would not be any negative publicity as a result of this crisis.

Overall 176 cases of food poisoning were investigated with diarrhoea and vomiting as main symptoms. Hotel guests with abdominal cramping, acute nausea and sudden fever were also included. All guests were medically treated in the hotel as no case required hospitalisation. After several days of thorough investigation the cause was identified in the sushi/sashimi section of the buffets of all hotels in the chain within that week (a standard item). Laboratory analyses of the food samples showed that the food item that showed the strongest association with foodbourne illness was a batch of tiger prawns (especially imported from Malaysia for the chain), served raw as sashimi in the sushi buffet, and which was culture positive for a pathogen called vibrio parahaemolyticus. This is a halophilic (salt-requiring) bacterium naturally found in warm marine and estuarine environments. As the contaminated prawns were used raw for the sashimi the bacteria were not killed. There was also a significant degree of cross-contamination (bacterial transfer) with other items served in this section of the buffet.

Despite its rigour, the CMP did not have the anticipated results. The media relations department managed for the crisis not to hit the headlines but a major key account, an international tour operator, was lost. Substantial amounts of money were paid in compensations to avoid legal action from guests and tour operators and, eventually, the reputation of the chain has received a major blow from which it is still recovering.

Narrative analysis of the crisis

The hotel chain had significantly invested in the development of rigorous CMPs using the assistance of two specialist consulting firms. The CEO was confident that the plan would work perfectly.

> We had conducted a simulation exercise only five months ago. The scenario was similar but not in such scale. Nevertheless, we all felt confident that although it was a highly unexpected situation, the plan was designed with such a crisis in mind and we would be able to deal with it effectively. We did not expect that some people would not be able to cope and that some others would react in such a negative manner (CEO).

One member of the executive team, in its evaluation meeting in the aftermath of the crisis commented:

> The results were disappointing. This CMP was supposed to protect the chain and it failed. The level of detail in the planning was misleading. What looks good in paper does not really work in practice. What we thought that would be a co-ordinated response turned out to be a complete failure (Executive Committee Member).

Crisis response as a complex co-evolving system

The detail in the planning has been really impressive. However, it did not work in all situations. Some managers needed this level of detail and some did not. A uniform response in all properties is strongly desirable; however, the levels of the crisis were not the same in all properties. One important insight of seeing crisis response as a complex co-evolving system (CCES) is that evolutionary processes and processes of self-organization may lead to a multitude of new order situations which are not necessarily all optimal. Near-optimal (non-perfect) solutions can be found – but exactly what it is cannot be predicted (Peters, 1999, pp. 125-133). Such an insight calls for a new view on what objectives crisis plans and tools can realistically be expected to achieve. The technocratic structural paradigm of crisis planning with a focus on static optimisation and rigorously designed actions – illustrated here with the creation of two CTFs aiming at key account guests – must shift to an evolutionary paradigm which focuses on dynamic adaptability. By allowing a number of diverse responses – depending on the situation each time and provided that the various actors will assume full responsibility of their actions and will not put at risk the well being of the organization- the organization will explore its "space of possibilities" (Mitleton-Kelly, 2004). Failure is allowed as long as it is not a result of recklessness and should not be penalized. Rather, it enriches –in its own way- the organizational crisis response learning, which Mitroff (2005, p. 210) emphasizes that it should be "no-fault learning".

The purpose of the crisis response system

Although the chain has embraced crisis management planning for almost two years now, no training as such was offered to the property managers and no "crisis culture" was created. The only crisis training activities they went through were two simulations: one for terrorist attack and one for major product failure. Again in the aftermath of the crisis the executive committee commented on this.

> As a company, we had the foresight to invest on crisis management planning and training at headquarters level. However, we were very myopic in terms of deployment as we assumed that by sending to our units the CMPs and by conducting one simulation every eight to twelve months we would achieve a high level of crisis preparedness (Executive Committee Member).

> The mere existence of CMPs does not mean that the entire chain is "crisis prepared". We were like a head detached from the rest of the body. We should make sure that we create a common mindset throughout the chain in terms of what a CMP means and what it is here to do (Executive Committee Member).

The managers themselves did not really know what to do. They were given a detailed sequence of tasks aiming at "effective crisis response" in their property but were not sure about the whole picture.

> In our region there are three properties. In a communication with my colleagues in these properties we realized that we were asked to act mechanically not really knowing why we do what we do. We all understood that we had to deal with infected customers and try to minimize the negative image that this crisis could cause for the chain but we could only guess that each specific action we were taking would contribute to a "grand design" (Property Marketing Manager).

The purpose of the response system needs to be redefined by replacing the narrow objectives of the CMP's tasks with the broader concepts of the organization's robustness and resilience: the response system should enable the organization to become resistant to perturbations and enhance its capacity to restore itself after a crisis. The hotel chain of this case study did quite well in terms of articulating a goal but did not involve unit managers at all in this process, failing to make it "common". This common goal should serve as an "internal model" or "mental compass" for the organization's self-organizing processes and should be co-created with all the actors involved. This co-creation of a crisis culture or "crisis leadership" (Mitroff, 2004) can be propagated and permeate the entire organization, but it largely depends on the degree of connectivity between the various actors.

Distributed control

In addition to the lack of a crisis response culture and a "mental compass", the very rigorous and rigid CMP did not allow any flexibility for the unit managers to act according to their better judgement and deal with the crisis as they felt appropriate.

> The plan was clear but in the simulation a few months ago I was reprimanded for not following all the steps that I was supposed to. In this case I saw that I had to react swiftly but was not ready to loose my promotion and stuck to the plan all the way (Property Marketing Manager).

> We felt that our hands were tied. I had dealt in the past with similar situations but this time I had to go "by the book" and this meant many-many unhappy guests (Property General Manager).

> The situation in our property was not that severe. We only had two guests with acute symptoms and a handful with nausea. We could handle the situation swiftly without making such a big fuss. I felt the headquarters' breath on my neck in every step I made. I understand the seriousness of the situation in other properties but, for us here, this was over the top (Property Operations Manager).

Another unanimously criticised aspect of the plan was the CTFs that, although supposed to help property managers to deal with the crisis, in many cases actually disrupted them.

> The only symptoms in my hotel were "key account" guests and I was not allowed to deal with these. The plan stated that only the CTF should deal with them. The tour leaders were furious and the CTF was not arriving. I had to do something and therefore I bent the rules (Property Marketing Manager).

Some unit managers while waiting for the CTFs asked permission to deal with the "key account" guests proposing specific strategies.

> E-mails from properties that were not yet reached by the CTF were "falling like rain". Each property was proposing some strategy in dealing with key account guests but the instructions were clear. However, we noticed that several of them were proposing quite similar strategies. In the fourth day, we allowed unit managers to act upon these cases even if the CTF was not there but the damage was already done (Executive Committee Member).

The behaviour of the system is determined by its agents' interaction at a local level and this is the reason why the control of the crisis response system has to be distributed among its agents. All parts contribute evenly in a crisis situation, perhaps attempting diverse local interventions which will depend on four crisis response constraints: crisis characteristics, local conditions, available resources and prior crisis response experience. In practice, different alignments will appear and as the both risk and responsibility are shared (Comfort, 1999) they will start "competing" for more resources. Once one type of crisis intervention acquires a critical mass of agents and resources, the system's interlocking positive and negative feedback loops will amplify it and suppress the others, spreading the alignment throughout the system. According to Comfort (1996) all that is needed is sufficient structure to hold and exchange valid information that will support agents' actions towards the common goal and processes of self-organization where informed agents initiate action, but adjust their action to that of others operating toward the same goal in accordance with changing needs.

Self-awareness by diffuse feedback

The crisis response system was well designed in terms of feeding information to and from the hotel chain's headquarters. An e-mail communication system and a dedicated crisis website in the chain's intranet were in place. The reporting system worked well in identifying the crisis at its early stage but the nature of the crisis itself (the incubation period ranged from 2.5 hours to 38 hours) plus the fact that the first symptoms were reported on a Saturday evening did not allow for much preparation. The initial conditions of the crisis could no longer be influenced.

> The flow of information from the units was very good. Everyone did an excellent job. Our crisis centre did also a very good job in collecting information important for the CM team, the CTFs and the media relations department. In retrospect our crisis website could be used more effectively (Executive Committee Member).

Perhaps the information in the headquarters was sufficient but at property-level, apart from the CMP and grapevine there was not much. The point about the crisis website was also picked up by most of the respondents in the units. The flow of information was abundant only from the units to the headquarters whereas the headquarters was only issuing directives for the managers without any further information about the situation of the various properties or any developments taking place.

> I knew what was going on in the other properties only because I or my colleagues took the initiative to communicate with each other. The intranet's site only provided limited

> information and only when the tiger prawns were confirmed as the crisis cause by the majority of the properties, the information was posted in the site. In the meantime, we did not have official information as to how many guests were infected in the entire chain, where exactly the most infections were located and how severe the situation was in each property (Property General Manager).

The crisis response system must have a way to monitor its overall performance. Segel (2000) argues that although there is a tendency in the literature to use the word "feedback" with the meaning of influence ("in this highly interconnected system everything feeds back on everything else"), he prefers to identify feedback "with sensor-based control of basic tasks" for elements in an interacting system (Segel, 2000, p. 40). He suggests that since complex systems influence not only their own state but also the state of their external environment, an informational network of sensors that sense these influences is needed, which he calls "diffuse informational network" (where diffuse has the meaning of distributed). Here, the detection system worked quite well as the property managers were the sensors reporting the signals of the crisis. However a crisis response system needs a series of sensors for particular crisis response tasks (not only signal detection at the prodromal crisis stage but also for crisis mitigation and damage limitation tasks during the acute crisis stage and recovery tasks during the chronic stage) that will enable the system tune the behaviour of its agents accordingly in order to optimise its performance.

Non-linear system connectedness

The CTFs' "wave-like" deployment, although in paper ideal has left the managers in remote areas without help for several critical days. Due to an old company mentality these were also the ones with less experience (all young managers were sent to resort hotels located in remote areas, and the more experienced were gradually relocated to properties closer to headquarters signalling this way their career path towards the higher levels of hierarchy).

> I never dealt with such a massive food poisoning. My colleagues were as inexperienced as me. The exercise a few months ago taught us a lot but this was real situation with real guest being sick and the responsibility was huge. We were the last property visited by the CTF. Thank God we did not have any casualties (Property General Manager).

More experienced unit managers suggested that the CTF did not help them at all. Some did not even have any problems in their properties and thought they would be more useful in helping less experienced ones.

> For us, the CTF's visit was a waste of time. We could have dealt with the situation alone. These guys are good but I felt that their presence here was not productive. They would have been more useful to other properties where the management was struggling with far more serious problems (Property Operations Manager).

> We are located only two hours away from [X property] which had 23 infected guests. We could have helped them but in "red alert" situations the CMP requires us to be in the property 24/7 (Property General Manager).

The concept of CTFs was quite successful and could have worked a lot better should the information flow be more decentralised, two-way and horizontal as well as vertical. With multiple agents reviewing and checking the progress of the crisis response, errors and areas for reinforcement would be discovered more readily. If this information

infrastructure is not fully developed, or if there is a weak link among the agents, the system's performance will be hampered (Comfort, 1999). In our case both conditions were present in the system. In order for such breaks not to be fatal, the system needs to take full advantage of the most basic characteristics of CCES to control its functions: non-linear connectivity. Building on the system's diffuse feedback, when a weak agent is detected, the system should employ a self-correcting mechanism which will restructure agent connectivity by shifting the number of connections (and streaming available resources -in our case managers of adjacent properties without severe problems and CTFs) from agents that are able to cope towards those that are not. By allowing such a dynamic resource allocation, asymmetric demand problems (Arens and Rosenbloom, 2002) are resolved and crisis response is endowed with flexibility and resilience.

Exaptation and scaffold response

The uniform treatment of key account guests was only partially successful as one major key account was eventually lost as a result of this crisis and a few thousands of Euros were spent for compensations to avoid litigation.

> The CTFs' response was proven inadequate. Everybody (CTFs and property managers) were acting according to plan, only this plan was not good for all our customers (Executive Committee Member).

> We should be allowed to try different ways of dealing with the infected guests and I do not mean in terms of medical treatment but in terms of image recovery. Clearly, the line taken by the CTF with "key accounts", although sound, was not working with all these guests. Where we were allowed to work on individual "non-key account" guests we were 100 per cent successful. More flexibility allowing more imagination and even some extreme ideas were needed (Property Marketing Manager).

Crisis response is context-dependent in that under some conditions, if the diffuse feedback indicates that the response is ineffective, adjustments will be required. In a crisis situation with human victims, a high degree of flexibility is needed. This often requires new connections or novel ways of response using what Kauffman (2000, p. 130) calls evolutionary adaptation or "exaptation". When the crisis culture is set in such a way that allows the exploration of the space of possibilities, exaptation is exploring a slightly different solution (the "adjacent possible" according to Kauffman), using existing building blocks of knowledge as a scaffold, recombined in a novel way. Since the less-effective, older responses are often retained, this scaffold response provides the crisis response system with a series of back-up responses to be used – if appropriate – in future crises and ensures an orderly progression of events during its evolution.

Conclusion

This case study has shown that a detailed CMP does not necessarily guarantee an effective crisis response. The narrative analysis of the collected data has identified the weaknesses of this particular crisis response whereas complexity theory has provided a theoretical foundation for the discussion on the ways that these weaknesses can be overcome. The management of organizations should view crisis response not as a procedure but as a living system within their organization and enable this system to achieve its purpose, which is not the solution of a problem but to create the conditions

that enable the solution of multiple problems. Complexity science offers a lens and a vocabulary to describe a framework for such a system (Figure 1).

The system should not aim at specific agent behaviours and actions but at the collective robustness and resilience of the organization. It should set the rules of interaction between its various agents but not dictate their actions. It should provide enough structure for the business to operate and information to flow easily to and from all parts of the system and allow flexibility for the agents to self-organize at local level according to the particular conditions of the crisis. The organization should have in place a diffuse feedback network of sensors that can continually detect warning signals and assess the progress of the crisis response. This diffuse feedback should allow the system to self-correct if needed and the agents to self-organize by modifying their crisis response behaviours. Whenever weak response links are identified, the system should be able to vary its connectivity accordingly by reallocating its resources and offering more support to these links. Finally, the system is an autodidactic one, i.e. it learns from its experiences and stores its knowledge for future use. When an older response is proven ineffective to a current crisis, the system should be able to explore the "adjacent possible" and recombine older responses in novel ways.

Crisis situations can effectively be considered as "far-from-equilibrium" conditions. Complexity science can give a new context to crisis response. As illustrated by an excellent metaphor by Goss *et al.* (1993, p. 100) "context is like the colour of the light, not the objects in the room". The concepts of complexity science give us another view of the interactions between crisis response and the evolution of the organization, far from equilibrium dynamics, positive and negative feedback loops that can sustain or offset the crisis response, as well as the important fact that crises are themselves complex systems and therefore often not easily controllable by the organization. Several areas of crisis management are opened to complexity researchers. For example, scholars could explore the conditions that enable or inhibit an organization to effectively detect and interpret early crisis warning signals. Studies could be undertaken to investigate how can "path-dependence" and "behavioural lock-ins" be

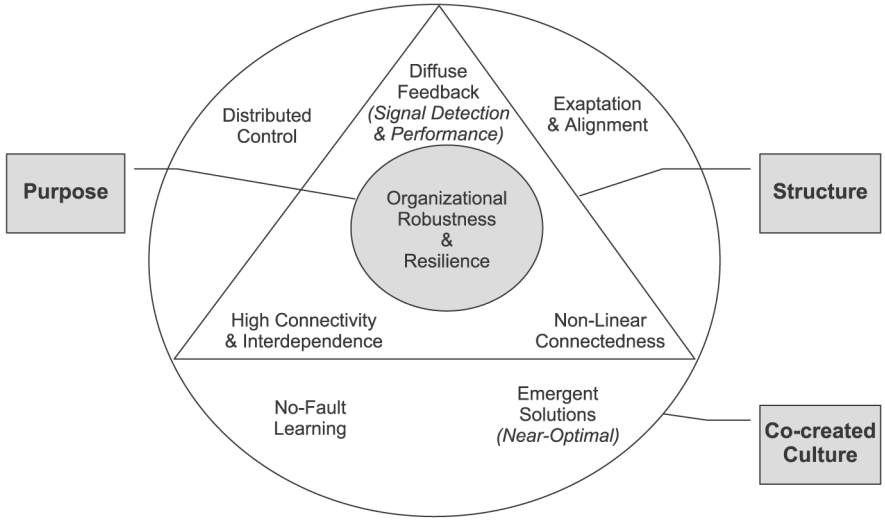

Figure 1.
A complexity science framework for a crisis response system

avoided when existing building blocks of knowledge in crisis response are recombined. Moreover, scholars must give additional attention to emergent phenomena in the crisis, preparedness, damage limitation and recovery phases of an organization. Also, given that crisis response should not be seen as a procedure but as a living and evolving system, and that the agents of this system should realize that they are its essential components and modify their agendas accordingly, it would be very interesting to explore – using complexity principles – the kind of leadership necessary to generate these realizations and behaviour modifications. Another area deserving research focus is the impact of initial conditions on the emergent new order in the crisis recovery phase of an organization. In any case, it is clear that a complexity lens will help researchers better understand the behaviour of human systems under crisis situations resulting in a more effective coordination of responses to these crises.

Notes

1. Battram (1998:210) explains that "fitness is a biological concept which describes the relative "success" of a species in relation to others in its environment … and can be seen as a measure of how well an "actor" is adapted to its niche in the landscape". An organization is constantly trying to optimize its fitness in its competitive landscape by getting on a peak and aiming at a relative competitive advantage.
2. A "local optimum" is a solution, which is not the best solution available, but better than any alternative solution in hand. The metaphor associated with the term is that of hikers who climb and reach the top of a small hill. They can not continue going uphill and must first go down, off the hill, before climbing the larger mountain (Battram, 1998).

References

Allen, P. (1994), "Evolutionary complex systems: models of technology change", in Leydesdorff, L. and van den Besselaar, P. (Eds), *Evolutionary Economics and Chaos Theory: New Directions in Technology Studies*, Pinter Publishers, London, pp. 1-17.

Arens, Y. and Rosenbloom, P. (2002), "Responding to the unexpected", report of the workshop held in New York, 27 February-1 March, Information Sciences Institute, University of Southern California, Los Angeles, CA, available at: www.digitalgovernment.org/library/library/doc/arens_responding.doc (accessed 24 May, 2005).

Audet, J. and d'Amboise, G. (2001), "The multi-site study: an innovative research methodology", *The Qualitative Report*, Vol. 6 No. 2, available at: www.nova.edu/ssss/QR/QR6-2/audet.html (accessed 12 September, 2005).

Battram, A. (1998), *Navigating Complexity*, The Industrial Society, London.

Beeson, I. and Davis, C. (2000), "Emergence and accomplishment in organizational change", *Journal of Organizational Change Management*, Vol. 13 No. 2, pp. 178-91.

Begun, J.W., Zimmerman, B. and Dooley, K. (2003), "Health care organizations as complex adaptive systems", in Mick, S.M. and Wyttenbach, M. (Eds), *Advances in Health Care Organization Theory*, Jossey-Bass, San Francisco, CA, pp. 253-88.

Boin, A. and Lagadec, P. (2000), "Preparing for the future: critical challenges in crisis management", *Journal of Contingencies and Crisis Management*, Vol. 8 No. 4, pp. 185-91.

Caywood, C. and Stocker, K.P. (1993), "The ultimate crisis plan", in Gottschalk, J. (Ed.), *Crisis-Response: Inside Stories on Managing Image under Siege*, Gale Research, Detroit, MI.

Comfort, L.K. (1996), *Self-organization in Disaster Response: The Great Hanshin, Japan Earthquake of January 17, 1995*, Quick Response Report No. 78, Natural Hazards Center, University of Colorado, Boulder, CO, available at: www.colorado.edu/IBS/hazards/qr/qr78.html (accessed June 22, 2005).

Comfort, L.K. (1999), *Shared Risk: Complex Systems in Seismic Response*, Pergamon Press, Oxford.

Feagin, J., Orum, A. and Sjoberg, G. (Eds) (1991), *A Case for Case Study*, University of North Carolina Press, Chapel Hill, NC.

Fink, S. (1986), *Crisis Management: Planning for the Inevitable*, American Management Association, New York, NY.

Fonseca, J. (2001), *Complexity and Innovation in Organizations*, Routledge, London.

Fuller, T. and Lewis, J. (2002), "'Relationships mean everything': a typology of small–business relationship strategies in a reflexive context", *British Journal of Management*, Vol. 13 No. 4, pp. 317-36.

Goldsmith, P.D., Salvador, A., Knipe, D. and Kendall, E. (2002), "Structural Change or Logical Incrementalism?", *Turbulence in the Global Meat System, Journal of Chain and Network Science*, Vol. 2 No. 2, pp. 101-15.

Goss, T., Pascale, R. and Athos, A. (1993), "The reinvention roller coaster: risking the present for a powerful future", *Harvard Business Review*, Vol. 71 No. 6, pp. 97-108.

Goulielmos, A.M. (2004), "A treatise of randomness tested also in marine accidents", *Disaster Prevention and Management: An International Journal*, Vol. 13 No. 3, pp. 208-17.

Hall, R. and Andriani, P. (2003), "Managing knowledge associated with innovation", *Journal of Business Research*, Vol. 56 No. 2, pp. 145-52.

Harkema, S. (2003), "A complex adaptive perspective on learning within innovation projects", *The Learning Organization: An International Journal*, Vol. 10 No. 6, pp. 340-6.

Hatch, M. and Tsoukas, H. (1997), "Complex thinking about organizational complexity: the appeal of a narrative approach to complexity theory", paper presented at the American Academy of Management Meeting, Boston, MA, August.

Kauffman, S.A. (1993), *The Origins of Order: Self-Organization and Selection in Evolution*, Oxford University Press, Oxford.

Kauffman, S.A. (1995), *At Home in the Universe: The Search for Laws of Self-Organisation and Complexity*, Oxford University Press, Oxford.

Kauffman, S.A. (2000), *Investigations*, Oxford University Press, Oxford.

Lagadec, P. (2004), "Understanding the French 2003 heat wave experience: beyond the heat, a multi-layered challenge", *Journal of Contingencies and Crisis Management*, Vol. 12 No. 4, pp. 160-9.

Lewin, A.Y. and Volberda, H.W. (1999), "Prolegomena on co-evolution: a framework for research on strategy and new organizational forms", *Organization Science*, Vol. 10 No. 5, pp. 519-34.

Luhman, J.T. and Boje, D.M. (2001), "What is complexity science? A possible answer from narrative research", *Emergence*, Vol. 3 No. 1, pp. 158-68.

McMillan, E. (2005), "Encouraging strategic change by using complexity based principles: a case study of the Open University, UK", in Richardson, K. (Ed.), *Managing the Complex: Philosophy, Theory and Practice*, Information Age Publishing, New York, NY.

Maguire, S. and McKelvey, B. (1999), "Complexity and management: moving from fad to firm foundations", *Emergence*, Vol. 1 No. 2, pp. 19-63.

Mitleton-Kelly, E. (2004), "Ten principles of complexity and enabling infrastructures", in Mitleton-Kelly, E. (Ed.), *Complex Systems and Evolutionary Perspectives on Organisations: The Application of Complexity Theory to Organisations*, Ch. 2, Pergamon, London, pp. 23-50.

Mitleton-Kelly, E. (2005), "Designing a new organisation: a complexity approach", paper presented in the European Conference on Research Methods in Business and Management Studies (ECRM), Paris, 21-22 April 2005. available at: www.psych.lse.ac.uk/complexity/ICoSS/Papers/Designing_NewOrg%20.pdf (accessed 13 June, 2005).

Mitroff, I.I. (1988), "Crisis management: cutting through the confusion", *Sloan Management Review*, Winter, pp. 15-20.

Mitroff, I.I. (2004), *Crisis Leadership: Planning for the Unthinkable*, John Wiley & Sons, New York, NY.

Mitroff, I.I. (2005), *Why Some Companies Emerge Stronger and Better from a Crisis: 7 Essential Lessons for Surviving Disaster*, AMACOM, New York, NY.

Mole, K. (2004), "Systems theory and the common-sense view of advisers", *Journal of Small Business and Enterprise Development*, Vol. 11 No. 1, pp. 114-20.

Murphy, P. (1996), "Chaos theory as a model for managing issues and crises", *Public Relations Review*, Vol. 22 No. 2, pp. 95-113.

Pascale, R.T., Millemann, M. and Gioja, L. (2000), *Surfing the Edge of Chaos*, Three Rivers Press, New York, NY.

Pearson, C.M. and Clair, J.A. (1998), "Reframing crisis management", *Academy of Management Review*, Vol. 23 No. 1, pp. 59-76.

Peters, E. (1999), *Complexity, Risk, and Financial Market*, John Wiley, New York, NY.

Plsek, P.E. and Wilson, T. (2001), "Complexity, leadership and management in healthcare organizations", *British Medical Journal*, Vol. 323, pp. 746-9.

Polkinghorne, D. (1988), *Narrative Knowing and the Human Sciences*, State University of New York Press, Albany, NY.

Preble, J.F. (1997), "Integrating the crisis management perspective into the strategic management process", *Journal of Management Studies*, Vol. 34 No. 5, pp. 769-91.

Prigogine, I. (1989), "The philosophy of instability", *Futures*, Vol. 21 No. 4, pp. 396-400.

Prigogine, I. and Stengers, I. (1984), *Order Out of Chaos: Man's New Dialogue with Nature*, Bantam Books, New York, NY.

Redfern, S. and Christian, S. (2003), "Achieving change in health care practice", *Journal of Evaluation in Clinical Practice*, Vol. 9 No. 2, pp. 225-38.

Richardson, B. (1994), "Crisis management and management strategy-time to 'loop the loop'?", *Disaster Prevention and Management: An International Journal*, Vol. 3 No. 3, pp. 59-80.

Robert, B. and Lajtha, C. (2002), "A new approach to crisis management", *Journal of Contingencies and Crisis Management*, Vol. 10 No. 4, pp. 181-91.

Robson, C. (1993), *Real World Research: A Resource for Social Scientists and Practitioner-Researchers*, Blackwell, Oxford.

Seeger, M.W. (2002), "Chaos and crisis: propositions for a general theory of crisis communication", *Public Relations Review*, Vol. 28 No. 4, pp. 329-37.

Seeger, M.W., Sellnow, T.L. and Ulmer, R.R. (1998), "Communication, organization and crisis", *Communication Yearbook*, Vol. 21, pp. 231-75.

Segel, L.A. (2000), "Diffuse feedback from diffuse information in complex systems", *Complexity*, Vol. 5 No. 6, pp. 39-46.

Sellnow, T.L., Seeger, M.W. and Ulmer, R.R. (2002), "Chaos theory, informational needs, and natural disasters", *Journal of Applied Communication Research*, Vol. 30 No. 4, pp. 269-92.

Shrivastava, P. (1993), "Crisis theory & practice: towards a sustainable future", *Industrial and Environmental Crisis Quarterly*, Vol. 7, pp. 23-42.

Smith, A.C.T. (2004), "Complexity theory and change management in sport organizations", *Emergence: Complexity & Organization*, Vol. 6 Nos 1-2, pp. 70-9.

Stacey, R. (2001), *Complex Responsive Processes in Organisations*, Routledge, London.

Styhre, A. (2002), "Non-linear change in organizations: organization change management informed by complexity theory", *Leadership & Organization Development Journal*, Vol. 23 No. 6, pp. 343-51.

Torrieri, F., Concilio, G. and Nijkamp, P. (2002), "Decision support tools for urban contingency policy. a scenario approach to risk management of the Vesuvio area in Naples, Italy", *Journal of Contingencies and Crisis Management*, Vol. 10 No. 2, pp. 95-112.

Waldrop, M. (1992), *Complexity: The Emerging Science at the Edge of Order and Chaos*, Simon & Schuster, New York, NY.

Wilding, R.D. (1998), "Chaos complexity and supply chains", *Logistics Focus – The Journal of the Institute of Logistics*, Vol. 6 No. 8, pp. 8-10.

Yin, R. (1993), *Applications of Case Study Research*, Sage Publishing, Newbury Park, CA.

Yin, R. (1994), *Case Study Research Methods*, 2nd ed., Sage Publishing, Newbury Park, CA.

Further reading

Beinhocker, E.D. (1999), "Robust adaptive strategies", *Sloan Management Review*, Vol. 40 No. 3, pp. 95-106.

Clancy, T.R. and Delaney, C. (2005), "Complex nursing systems", *Journal of Nursing Management*, Vol. 13 No. 3, pp. 192-201.

Eisenhardt, K. and Brown, S. (1999), "Patching – restitching business portfolios in dynamic markets", *Harvard Business Review*, Vol. 77 No. 3, pp. 72-82.

Levinthal, D.A. (1997), "Adaptation on rugged landscapes", *Management Science*, Vol. 43 No. 7, pp. 934-50.

Corresponding author

Alexandros Paraskevas can be contacted at: aparaskevas@brookes.ac.uk

To purchase reprints of this article please e-mail: **reprints@emeraldinsight.com**
Or visit our web site for further details: **www.emeraldinsight.com/reprints**