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PROTECTION | PREVENTION | PREPAREDNESS | RESPONSE | RESILIENCE | RECOVERY



ARTIFICIAL INTELLIGENCE ETHICAL COMMAND DILEMMAS

Italian avalanche response; Public communications during London terrorist attack; IEDs in Iraq; Evolutions in medicine, a tactical medic's perspective; Virtual reality; Scanning risk landscape horizons; Role of lawyers in a crisis; Drones & robotics; Disaster epidemiology; Climate change & security; EENA & Waze pilot project

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comment

Since the publication of our last issue in December 2016, exciting changes have taken place. I am delighted to be able to inform readers and subscribers that I am now one of the owners of CRJ.

Supported by new business partners and co-owners, David Stewart and Kirsty McKinlay-Stewart, CRJ is now part of a new parent company, Crisis Management Ltd.

The new ownership of CRJ brings a fresh dynamism and outlook, ensuring that we maintain our position as the foremost international, multidisciplinary platform for practitioners, academics and all other individuals and organisations that are involved in crisis preparedness, planning and response.

We have ambitious plans for the future and there will be constant updates on what we are doing via the CRJ website, Twitter feed, LinkedIn Group and our monthly e-newsletter.

In addition to publishing CRJ, Crisis Management Ltd provides a wide range of services across the crisis management and resilience arena, including consultancy and training services – bringing the talents of some of the finest and most respected experts across the globe to this endeavour.

The future for CRJ is a positive evolution rather than a dramatic change, and we want our community to help shape that change. We have started this process with a slight tweak in terms of the publication's format and size, which have been redesigned so that we can include even more information within our pages.

You will find the content and scope are as wide-ranging as ever – from reports on the avalanche tragedy in Italy (p12) and the London terrorist attack (p16), to horizon-scanning articles on the threat landscape (p48) and climate change and security (p44). We discuss technology innovations in the form of virtual reality (pages 30, 34 and 68) and look at resilience more generally with a host of other articles.

The most vital element of the CRJ remains its community – our global readers, advertisers, authors and Editorial Advisory Panel – and we are committed to making sure that the quality and relevance of our content are maintained and developed even further.

The new team has already been out and about at various shows and events around the world and hope to meet many, many more of you over the coming months.



Emily Hough

The nature of hyper-complex crises

In this final part of his series on developing incident command systems to deal with today's hyper-complex crises, **David Rubens** sets the scene for how decentralised non-hierarchical response management systems can be developed

If traditional crisis management modelling saw crises as little more than large-scale incidents, limited in terms of their geographical spread and leaving the rest of the operating environment relatively unscathed, the nature of today's threats are infinitely more complex, with cascading consequences that are literally incalculable. The hyper-complex scenarios examined by Patrick Lagadec reflect the concerns first circulated in a seminal paper setting out the parameters for what were labelled 'wicked problems' by Rittel and Webber.

Initially focussing on issues of social planning, wicked problems describe open-ended, unbounded crisis environments, which can neither be described in traditional mechanistic terms, nor solved through traditional crisis management approaches.

Hurricane Katrina was a classic example of a wicked problem, in that the original triggering event soon became relatively unimportant in the consequential crises that it caused. Immediate crisis dilemmas included rescuing thousands of stranded citizens, housing, feeding and caring for tens of thousands of homeless people, restoration of a city, preservation of public safety in light of the impact on critical infrastructure, the impact on adjacent jurisdictions and the political implications of perceived failures of the government, the emergency management community, the homeland security agencies and the President himself, who was seen to embody those failures on the public stage.

The 2011 Fukushima earthquake and tsunami in Japan provide another example of where the initial trigger point soon became superseded by the impact of a nuclear breakdown, the subsequent cascading effects on the food supply to Tokyo and the threat of a transnational nuclear cloud, as well as disruption to the country's global component manufacturing supply chains.

Rittel & Webber's analysis identified a new class of crisis that would not only fail to respond to classical risk management methodologies, but had mutated into a completely different class of event. Similar to a virus that mutates so much from its original form that it not only refuses to respond to traditional approaches, but redefines the parameters of what the threat is, so the new threat must be seen in terms of a completely new and distinct topology, rather than being a sub-set of previously modelled problems. Unbounded and hyper-complex events

can no longer be seen merely as a higher, more dynamic form of accident. They are a central reality of the modern world. If classical risk management was the domain of the statistician, predicting future possibilities based on an analysis of an aggregate of the masses, the threat set by the new paradigm is predicated on the criticality of the singularity, the outlier – the unknowable and inconceivable.

The dilemmas that wicked problems pose to crisis managers, strategists and planners are twofold; the nature of their scale, complexity and non-bounded nature means any particular response option can only be made in a context of ambiguity, incomplete and uncertain information and organisational fragmentation. In other words, it is often hard to know what exactly the problem is, and almost impossible to know what the solution might be.

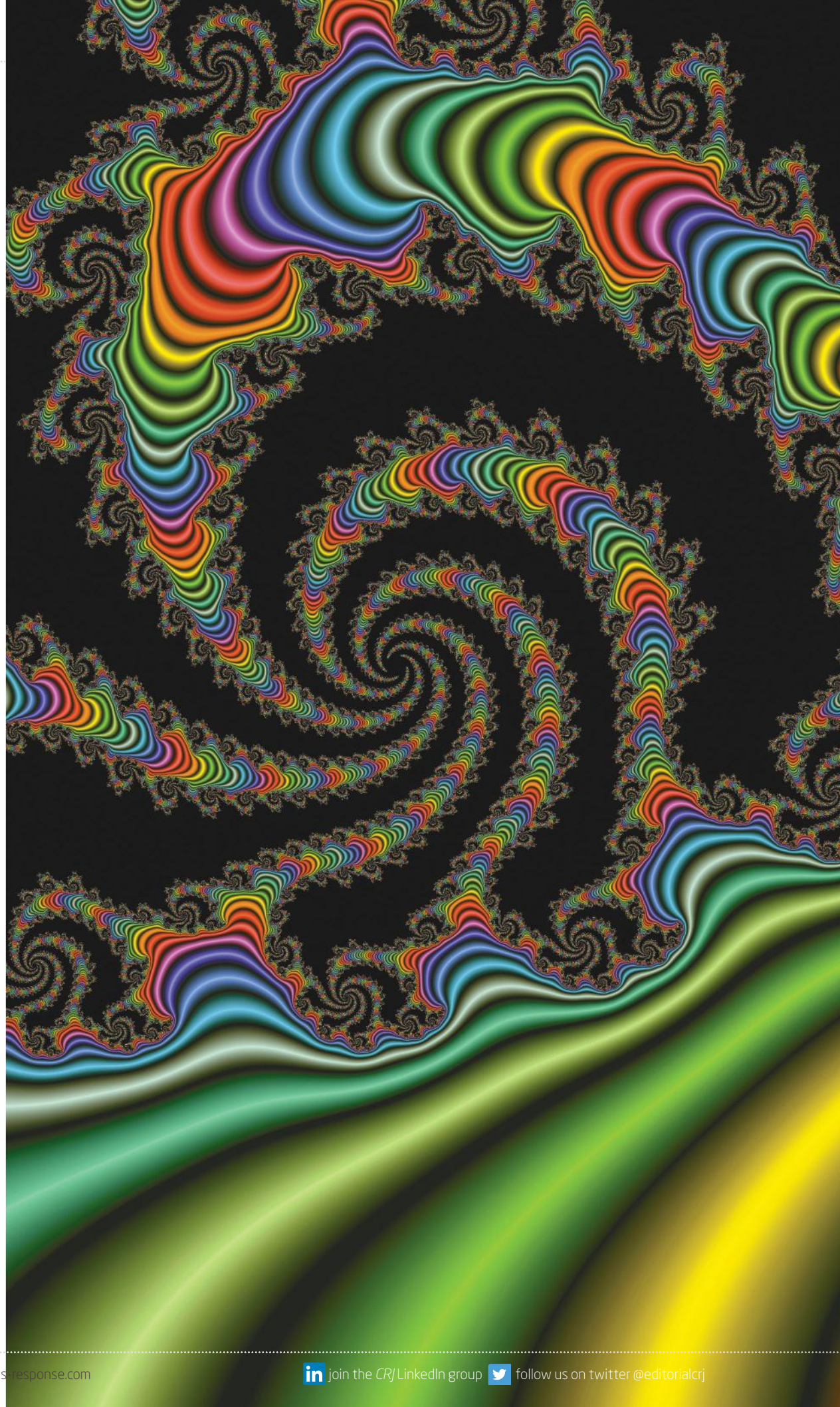
It is this ambiguity, created by lack of central single focus, combined with unbounded potential consequences and impacts, that distinguishes the true wicked problem from, for example, the major fire that Bigley & Roberts use in their critique of ICS within disaster management scenarios.

Wicked problems

The second problem is that there are no classes of wicked problems that can act as a template for possible responses. Any response to a wicked problem is, by definition, going to be innovative, self-generating and based on ad hoc meetings of minds between a disparate range of knowledge-holders, who will develop situational responsive solutions, based on their own knowledge, experience and insight. The simple truth of wicked problems is that anyone who thinks they have a solution has clearly not understood the question.

The polar opposite of such undefined, unbounded and unknowable situations are the tightly-coupled, interdependent systems described by Perrow (1999), in his study of high reliability organisations. Such systems, often sitting within the national critical infrastructure, are characterised by the potential catastrophic effects of even minor systems failures, involving both fast escalating (developing into fully-blown crisis), and rapidly cascading (affecting multiple levels of society across a wide geographical spread) consequences.

High Reliability Theory (HRT), is the theoretical modelling of decision-making that aims to create highly reliable operation management programmes that are fail-



In CRJ 3:1 (2007) Michel Nesterenko and Patrick Lagadec said that chaos theory – involving complex dynamic systems where behaviour is unpredictable, yet patterns can be observed – had appropriate applications in today's hyper-complex emergencies. How can we develop a command system that is ready to face these challenges?

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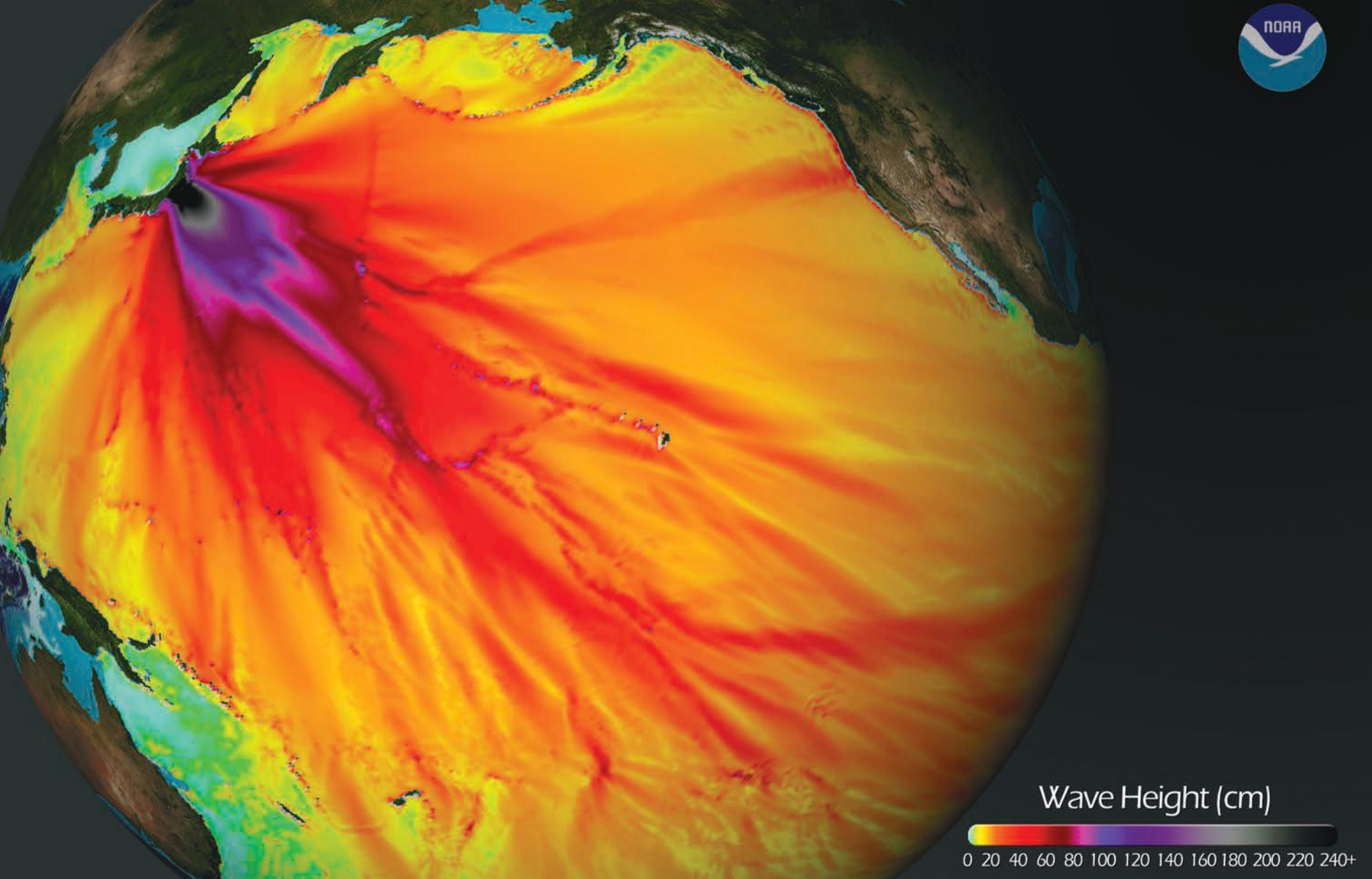
safe within the context of highly complex, interconnected and inter-dependent networks. HRT depends on granular modelling of system dependencies, identifying potential vulnerabilities and creating safeguards to ensure that the likelihood of any malfunction is minimised, while simultaneously identifying gestational problems at the earliest possible stage to allow early intervention.

It has generally been accepted that the highly interdependent and tightly bounded nature of HRT precludes the possibility of innovative and creative solutions to potential or actual problems. However, even within the system dependency and tight coupling of a major power management system, it is the ability of operators dealing with the immediate realities of emerging problems to create innovative solutions using their experience and improvisational abilities that allows them to deal with surprises and volatile events. In fact, the undirected actions of self-asserting operators responding to the immediate demands of an emerging crisis situation are seen as critical in almost every crisis.

This suggests that there may be lessons that can be drawn from the highly-designed environment of critical infrastructures that could have value and relevance within the unformed chaotic environment of crisis management.

The model of crisis management that has been discussed so far follows the assumption that correct analysis of a problem, through identification of critical decision paths, will allow the 'correct' solution to be discovered to reach a desired solution. However, with the growth of the understanding in concepts such as fuzzy thinking in the 1970s, it became clear that there were other decision-making methodologies available in addition to the centralised control of increasingly small components of activity. Although the reductionist, mechanistic models may have been appropriate to the problems of the emerging industrial age, they are not applicable to the messy problems characteristic of the 21st Century. Whether they are labelled as wicked, hyper-complex or catastrophic events, it is now recognised that responses to increasingly complex crisis scenarios are based on emergent ad hoc interactions between different groups, each with their own organisational culture, language and wealth of embodied experience. The challenge is to find a way of creating the space wherein these groups, each with its own highly developed but, at the same time, highly focused expertise, are able to develop collaborative relationships based on trust, communication and a recognition of the shared values of the other.

Rittel considered that the fundamental nature of wicked problems is that there is no answer to them, and although there may be experts who have particular specialist insight into and – understanding of – specific aspects of the crisis, there are no experts who can claim to know how to solve them. Solutions are not so much managed, as brought into existence through an iterative decision-making process that is in a constant state of flux. This perspective assumes solutions to crisis situations must be pragmatic and situation



responsive, rather than being predicated on the management of mechanistic systems-based and process-based solutions. The people who are interacting with the crisis environment are constantly monitoring and assessing changing situations and creating new decision-paths, which are monitored, assessed and adapted. This process is dependent on the interaction of experienced practitioners, who are the repositories of specialised knowledge that is in itself tacit, intangible and context-dependent. Such knowledge, by its very nature, resists attempts to codify it into universally applicable response plans.

Fuzzy gambling

The acknowledgment that the future state of the project is unknown, even as it is being initiated, changes the whole crisis management process from one of mechanistic control of a tightly-managed production procedure at the end of which there lies the finished article (the solution), to one where the project itself is seen as inherently innovative, experimental and ambiguous. Within such working spaces, project management strategies are more likely to be focused on a probe and learn methodology based on ‘clumsy solutions’, or even ‘fuzzy gambling’. This is where the project itself is seen as a learning, reflective

The 2011 Fukushima earthquake and tsunami provide examples of where the initial trigger point became superseded by the impact of a nuclear breakdown, the subsequent cascading effects on the food supply to Tokyo, and the threat of a transnational nuclear cloud, as well as disruption to the country’s global component manufacturing supply chains

NOAA Environ Visualisation Laboratory

process, progressing through a series of failures and improvement, and where managers can do no more than grope along in their move towards organisational goals. All this stands in contrast to the classical understanding of strategic decision-making, which is focused on developing deliberately conscious guidelines that can be used to help formulate decisions in the future. One of the fundamental challenges in wicked problems, which lies at the heart of all crisis management decisions, is the fact that there is no single correct answer, because there is no way of testing the outcomes or consequences of any particular option. All decisions are taken in the knowledge that not only are they likely to have unintended outcomes, but that those outcomes have a high potential for becoming crises in their own right. Rather than issuing predetermined responses that are transmitted through a highly striated network of hierarchical commands and instructions, the general tone is one of consultancy between peers holding embodied knowledge. As such, the role of the central command team is to co-ordinate actions and to support local teams in appropriating resources and resolving conflict, rather than directing and commanding. The realities of the challenges of responding to either unthinkable (9/11) or highly-predicted but nevertheless

surprising events (Hurricane Katrina), led to an understanding of the significance of Emergent Multi-Organisation Networks (EMONs) as a critical stage in creating effective solutions within the context of high-stress, highly unstable and rapidly mutating threat environments. The criticality of such ad hoc and often spontaneous EMONs in creating innovative solutions is offered as an alternative theoretical model to the tightly controlling centralised management system that has been the prevailing orthodoxy in crisis management studies. Its fundamental need – and nature – were described 50 years ago, by Burns in 1963: “Organismic systems are adapted to unstable conditions where new and unfamiliar problems and requirements continually arise which cannot be broken down and distributed amongst specialist roles within a hierarchy... Responsibilities and functions and even methods and powers have to be constantly redefined through interactions with others participating in common tasks or in the solutions to common problems.” However, despite the ad hoc nature of such non-hierarchical, decentralised, free-forming emergent groupings, the efficiency of both the individual components and the interconnected whole are dependent on the amount of training that participating agencies undertake. As such, effective response within the unstable crisis environments in which EMONs thrive, is still dependent on pre-event organisational preparation and training, as well as the capabilities and motivation of critical individuals. Given the lack of a theoretical understanding of how the knowledge and insight of experienced practitioners can be encoded and transferred to organisational frameworks, which can then be utilised in a range of contexts, it is no surprise that those who talk of such issues often sound as though they are searching for the correct terminology that can capture and convoy exactly what is required. In acknowledging that such professional insight is, by its very nature unspoken, intuitive and even indescribable, one is reminded of the opening lines of the Tao Te Ching: “Tao which can be described in words is not The Tao.” Bresnen et al stated in 2003: “In case of process innovation... what is learned is often tacit, intangible and context-dependent... Such learning is not only difficult to measure and evaluate, it is also difficult to capture in explicit forms, in ways that can be understood and applied in new contexts... How is the organisation able to capture learning and deploy it over the long term, when it is so embedded in the individual and manifested in their particular expertise and range of contacts... The individual embodiment of engineering knowledge and expertise militated against the transfer of such knowledge...” It may seem paradoxical to ask how that which cannot be talked of can be shared, and that which cannot be described can be taught. But just as with any paradox, the answer lies not in confronting mutually self-negating contradictions, rather in rephrasing the question. As such, the role of the strategic crisis manager is not so much to facilitate the transfer of explicit knowledge directly from one knowledge holder to another knowledge receiver, much less to command and direct, but rather to create and support a working environment that facilitates the development of a truly interactive community, one which can collectively develop and explore the innovative solutions that are at the heart of modern crisis response. Our ability to understand, model and then accept

the challenges associated with hypercomplex crisis events will be crucial in developing a crisis and disaster response capability appropriate to the challenges of the 21st Century. The recognition of the nature of crisis response as a free-form interaction between a community of knowledge holders, each with their accumulated experience, insight and embedded understanding of potential options, and the ever-changing situation that they are facing, will set the foundation for the ongoing debate as to how decentralised non-hierarchical response management systems can be developed. While many of the issues covered in this series are well known, it is the ability to transmit the lessons learned to the realities of actual crisis response environments that will be the true test of their value. It is hoped that this paper will contribute to the dialogue currently being undertaken by members of the emergency and crisis management community, whether from the practitioner or the academic wings, and will have some value for those people dedicating their lives to delivering innovative solutions to some of the most testing events that we are currently facing.

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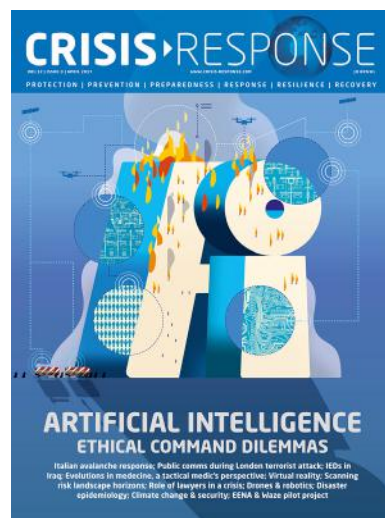
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