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Interoperability

Theory & Practice in UK Emergency Management

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Introduction

The fuel crisis and floods of 2000 and the foot and mouth crisis of 2001 exposed serious weakness in capability across England, Wales and Scotland, particularly when dealing with wide area emergencies (Cabinet Office, 2004; Coles, 2004; Walford, 2009). The subsequent terrorist attacks of 9/11, Bali, Madrid and London bombings of July 2005 further emphasised the need to re-examine emergency planning arrangements and to restructure them where necessary (Buckle et al., 2006). They were becoming increasingly complex and beyond the boundaries of any single organisation (Cabinet Office, 2004)

Such events are illustrative of the array of potentially devastating threats society faces which typically will require government intervention (Boin et al., 2010). Not only is the frequency, scope and magnitude of such events increasing (Mitroff, 2004), but their consequences are more problematic because of the complexity and interdependency of technological systems (Rosenthal & Kouzmin, 1997). Deeming (2012) further suggests that in the future society will be beset by what he calls '*wicked problems*' and that future challenges will be '*quicker, harder and from different directions.*' Society's ability to manage such extreme events depends on its ability to understand, anticipate, prepare for, and respond to them (Comfort, 1999).

However, effective management of major incidents requires responder organisations to operate beyond their 'normal' individual scope of duty and instead act as a collaborative network (March & Simon, 1958; Mintzberg, 1979). Such *ad hoc* networks, increasingly being referred to as dynamic coalitions (Bryans et al. 2006) comprise of different organisational structures, cultures (Mendonca et al. 2007), policies and areas of expertise (Healey et al. 2009). Collaborative networks are ideally characterised by reciprocity, representation, equality, participatory decision making, and collaborative leadership (deLeon & Varda, 2009). The success of such networks depends on the ability of their leaders to organise structures, resources, and interactions when bringing together participants with different authority, motivations, interests, skills, and access to information (Moynihan, 2005).

The need for collaboration makes major incident management challenging, since responder organisations must coordinate as a collective whole. In other words, demonstrate effective interoperability. The structure through which interoperability is to be delivered is the Strategic Coordinating Group (SCG). The SCGs were established as part of the Civil Contingencies Act 2004 when the UK Government recognised the need: (i) for a single framework for civil protection in the United Kingdom designed to meet the challenges of the 21st century; (ii) to improve the UK's ability to deal with the consequences of major disruptive incidents by improving the planning process at a local level, building better contacts between agencies and improving the link between local areas and central government; and (iii) clearly identifying the roles and responsibilities of local responders, ensuring consistency in civil protection activity and enhancing performance (Cabinet Office, 2004).

Despite the desire for interoperability during major incident response, collaboration between responding agencies is often ineffective (Healey et al. 2009; McEntire, 2008;

Stephenson, 2005). The inherent scale and complexity and trans-boundary nature of these events reflects the need for interoperable management (Rosenthal et al. 2001), yet this is juxtaposed by the inherent difficulty of achieving interoperability 'in practice'.

To improve UK interoperability 'in practice', the Joint Emergency Services Interoperability Programme (JESIP) aims to ensure the emergency responders are trained and exercised to work together as effectively as possible, at all levels of command in response to major or complex incidents. Moreover, by creating effective governance structures and coordination; ensuring joint approaches to working and training with supporting doctrine; and shared understanding of roles, responsibilities and capabilities, leading to improved communications at incidents, JESIP seeks to ultimately improve interoperability and collaboration. There are four key areas:

- Doctrine & Organisation
- Operational Communications
- Shared Situational Awareness
- Training & Exercising

James noted in 2013 that emergency management is becoming increasingly theorised and reported that at a JESIP conference in November 2012 Cole remarked "*that much of what is needed to improve interoperability is already written, it just had to be badged by JESIP.*" (James, 2012: 4). With this in mind this research will focus on bringing some of this research together to analyse the four areas identified by JESIP and also consider other interoperability frameworks. Having established the issues relevant to effective interoperability from the literature a critical diagnostic lens, namely the Onion Model of Crisis Management (Pauchant & Mitroff, 1992), will be applied to identify any areas for improvement.

Crisis prepared organisations quickly capture and adapt to environmental information by changing their behaviours and structures. They have been described as having four levels:

- Level 1: strategies policies and procedures
- Level 2: structure, coordination and communication
- Level 3: organisational culture or norms and practices; and
- Level 4: individual perceptions and beliefs of staff within the organisation

Pauchant and Mitroff likened these layers to those of an onion with levels 3 and 4 being deeply buried within core of the organisation and quite often difficult to know. To truly understand levels 1 and 2 the layers of the onion must be stripped away to reveal what really motivates the organisation in levels 3 and 4.

To be crisis prepared an organisation must perform well through all four layers. The organisation must reach beyond the first two superficial aspects of the organisation into the hidden unseen layers and deep structures (Gersick, 1991), which are essential in determining whether the organisation will be crisis prone or crisis prepared.

An essential element of being prepared is learning from previous crises. Schein (1996) suggests that for an organisation to learn it must be systemically healthy; they must have

“a sense of identity, purpose or mission; a capacity on the part of the system to adapt and maintain itself in the face of internal and external changes; a capacity to perceive and test reality and some degree of internal integration and alignment of the sub-systems that make up the total system.” As such a learning organisation may be able to ensure that the lessons identified and subsequently learned will result in changes to the organisational culture, norms and operating practices. These will be successfully embedded in the values and beliefs of the organisation and change the behaviour of those who work in it. The absence of such a culture will almost certainly mean that learning will not take place. The result will be systemic failure in the organisation.

Interoperability

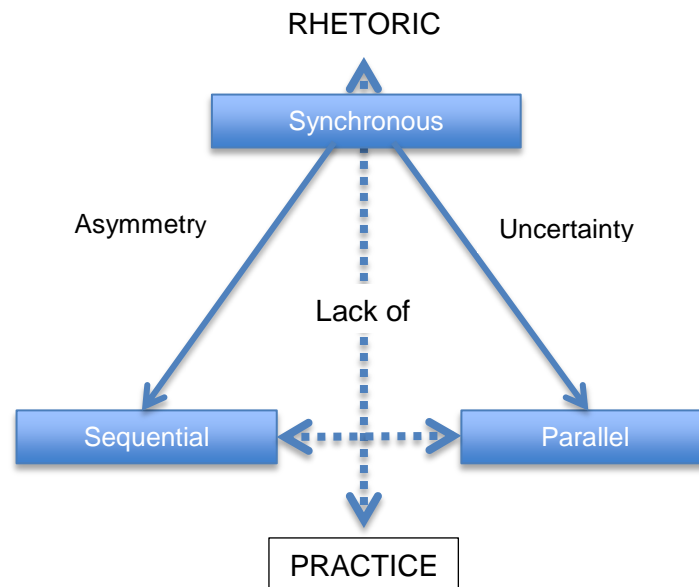
The nature of emergencies today forces emergency response and recovery organisations to collaborate in order to be effective (Bryson, Crosby, & Stone, 2006; Callahan & Holzer, 1994; Vangen & Huxham, 2003). Emergency management involves different organisations interacting to manage risk or coordinating their activities in response. However, emergency management tasks are inherently complex, dynamic, and occur in the context of high velocity environments (Oliver & Roos, 2005). Therefore, emergency management requires rapid knowledge sharing and decision coordination among multiple organisations working in ad-hoc partnerships across different levels and locations (Allen et al., 2014; Becerra-Fernandez et al., 2008; Schutte, et al, 2013).

Because of the complex, dynamic and inter-organisational nature of emergency management tasks, effectively managing knowledge sharing across organisations has become a critical emergency management success factor (Comfort et al., 2004). Those agencies involved in the collaborative process must satisfy interoperability requirements in order to adequately fulfil their mission. In major incidents, involving participants from different organisations, interoperability is critical when sharing data, services, knowledge, skills, and resources (Chen et al., 2008; Daclin & Chapurlat, 2009; Kapucu et al, 2010; Kuehn et al 2011; Seifert, 2008). However, for historical, geographical and cultural reasons, the organisations responsible for delivering emergency response services often perform differently to that which is expected (Berlin & Carlström, 2011) which results in the lack of appropriate interoperation and collaboration, more often than not at the operational level (Buscher, et al 2013; Noran, 2012).

In a study of the collaboration between the Swedish emergency services Berlin and Carlström (2011) found that although collaboration was supported and discussed at the highest level with emergency service organisations, in practice (at the scene of an accident) collaboration is often minimised for several reasons. The study utilises the concepts of *sequential, parallel and synchronous* working to describe the way in which operations were carried out at the accident scene. They draw a number of conclusions as to why collaboration is not as good as it could be prominent among them are issues of *uncertainty, asymmetry and lack of incentives*. They conclude by suggesting that there is much talk of collaboration at the strategic level of the organisation (rhetorical) but this is not transferred to the operational level at the scene of an accident because of the issues noted above. Instead what occurs is either sequential working (one service follows another to the scene) or parallel work where each service works alongside each other

rarely crossing organisational boundaries. Figure 1 illustrates the mechanisms that minimise cooperation.

Figure 1: Cooperation Minimising Mechanisms (Berlin & Carlström, 2011)



(Adapted from Berlin and Carlström, 2011)

Berlin and Carlström provide some useful insights as to why interoperability does not always work in practice in Sweden and which may well be also true for the UK.

Defining Interoperability

The notion of interoperability is ubiquitous but not easy to understand due to its numerous definitions and interpretations. Ford et al. (2008) point out that thirty-four definitions of interoperability have been proposed since 1977. The following examples illustrate the evolution of the concept from its technical roots to a broader management application.

The concept of interoperability originated in science and electronics. This is reflected in the definition of interoperability provided by IEEE as *'the ability of two or more systems or components to exchange information and to use the information that has been exchanged'* (IEEE, 1990). This technical definition has been extended for the organisational context, where interoperability *'resides at the interplay of human systems, business processes, and enabling technologies'* (Stegwee & Rukanova, 2003). More specifically, in relation to tasks, it has been defined as the *'ability of one entity to accomplish tasks on behalf of another entity and the degree of the ability to jointly execute operation'* (Vallespir et al, 2005). In Europe, the definition issued from the Interop NoE (INTEROP, 2003) views interoperability as *'the ability or the aptitude of two systems that have to understand one another and to function together'* (Chen et al., 2007), or more generally, *'the ability of diverse systems and organisations to work together'* (Gottschalk, 2009).

Applying the concept of interoperability to a multi-national level, NATO's interoperability policy defines the term as *'the ability for Allies to act together coherently, effectively and efficiently to achieve tactical, operational and strategic objectives'*. Specifically, it enables forces, units and/or systems to operate together and allows them to share common

doctrine and procedures, each other's infrastructure and bases, and to be able to communicate. Interoperability reduces duplication, enables pooling of resources, and produces synergies among the 28 Allies, and whenever possible with partner countries (NATO, 2006).

ACPO (2009) defines interoperability, in the context of multi-agency cooperation, as '*the capability of organisations or discrete parts of the same organisation to exchange operational information and to use it to inform their decision making*'. In relation to the emergency response, interoperability has been comprehensively defined as '*the ability of disparate and diverse public safety agencies and their emergency response units to interact in emergency situations towards common goals, involving the sharing of information and knowledge between involved organisations and the public via defined or ad-hoc processes to achieve coordinated actions, by means of the exchange of data between their respective information and communication systems*' (Kuehn et al., 2011).

In the UK the Joint Emergency Services Interoperability Programme succinctly defines interoperability as '*the extent to which organisations can work together coherently as a matter of routine*' (JESIP, 2013).

Interoperability Frameworks

Interoperability can partly, but not completely, be subdivided into two distinct elements, namely, technical and organisational. The key issue within organisational interoperability is that it must include doctrine, people, procedures and training (Warner, 2004).

An interoperability framework consists of a set of rules and agreements describing how organisations should best interact with each other. The framework should also provide policies and guidelines for how standards should be selected and used (EC, 2008). Several commentators have highlighted that various frameworks use essentially the same concepts to discuss interoperability (Eslami-Andargoli et al 2013; Noran & Bernus, 2011), for example; organisational interoperability, semantic interoperability and technical interoperability. Further to this the US Department of Homeland Security (DHS) Safecom Program introduces the concept of the *interoperability continuum* in which they also consider governance, training and exercising and usage as well as leadership and investment in the sustainability of systems as part of their framework (DHS, 2013). Moreover, Chen & Daclin, 2006 suggest that the various barriers to interoperability should first be contemplated before different approaches to interoperability are considered.

Comfort (2002b) whilst not explicitly discussing interoperability suggests four conditions that must be achieved for effective response:

- Articulation of commonly understood meanings or understanding of the threat between a system and its members
- Sufficient trust among leaders, organisations, and citizens to overcome uncertainty and enable members to accept directions
- Sufficient resonance or support of the community between the emerging system and its environment to gain support for action, and
- Sufficient resources to sustain collective action under varying conditions

These attributes are similar to those which are necessary for effective collaborative policy network management. In other words, effective adaptive response and collaborative policy networks are dependent on: shared situational awareness among all participants; relationships built on trust and a belief by stakeholders that their activities are for the greater good of the agreed outcome; recognition and support that flexibility is essential to deal with emerging issues which may have been unforeseen; and sufficiently trained resources for all tasks they are expected to carry out under both routine and crisis states. Thus, sharing information, willingness to collaborate, and shared values are important factors for networks (Kapucu, 2006) and the key to successful adaptation is a move towards network organisation that uses many inter and intra-organisational links (Barabasi, 2003).

JESIP Interoperability Framework

The purpose of the Doctrine (JESIP, 2013) is to provide emergency service commanders with a framework to enable them to effectively respond together. The principles are applicable for all responding organisations and can be applied to smaller scale incidents, wide-area emergencies and pre-planned operations.

The Doctrine sets out the way responders should train and operate and is built upon a common backbone which defines terminology, principles and ways of working. It sets out principles of Joint Working, defined as ‘*a number of organisations working together on a course, or courses of action, to achieve agreed emergency response objectives*’. The principles must be applied by responders, and should be reflected in their Joint or Standard Operating Procedures.

Principles for Joint Working	
Co-location	Allows commanders to perform the functions of command, control and co-ordination, face to face, at a single and easily identified location
Communication	The passage of clear, unambiguous and timely information relevant to an emergency situation. Meaningful and effective communication underpins effective joint working
Co-ordination	The integration of the priorities, resources, decision making and response activities of each emergency service in order to avoid potential conflicts, prevent duplication of effort, minimise risk and promote successful outcomes
Joint understanding of risk	Sharing information and understanding about the likelihood and potential impact of risks and the availability and implications of potential control measures will ensure, as far as is reasonably practicable, that the agreed aim and objectives are not compromised
Shared situational awareness	A common understanding of the circumstances and immediate consequences of the emergency, together with an appreciation of the available capabilities and emergency services’ priorities

Barriers to Interoperability

The complexity of creating interoperability lies in the interdependence among policy, management, and technology capabilities and the gaps that exist (Pardo & Burke, 2008). However, technology only supports operational systems and practices. It cannot solve the interoperability problem. The core of the interoperability problem lies with how people in different organisations choose to work together rather than how they choose to talk to each other (Kapucu et al, 2010).

Ansell and Gash (2007) identify several critical variables that can impact the success of collaboration, including: prior history of conflict or cooperation, the incentives for stakeholders to participate, power and resources imbalances, leadership, institutional design, and a series of factors that are crucial within the collaborative process itself such as face-to-face dialogue, trust building, and the development of commitment and shared understanding. While, Allen et al (2011) highlight three factors that 'problematise' greater interoperability, namely rigid organisational structures; a silo approach towards achieving a shared object [each agency] has different ways of working, doing their particular role without thinking about other emergency services; and issues surrounding concerning classified data and trust. In more detail, Salmon et al (2011) categorise seven factors limiting coordination during multi-agency responses, namely organisation; information management; communication; situation awareness; equipment; cultural issues; and training.

Similar themes are identified by House et al (2013), in their research into the impact of multi-agency coordination on major incident decision-making. Their research highlights the following defining characteristics of interoperability, which if not achieved may become barriers to interoperability: common operational picture; clear superordinate goals; hierarchical multi-agency organisational structure; task interdependence; collective accountability; trust; and communication and information exchange. Finally, a survey of nearly 2000 operational emergency services personnel in the UK carried out by Skills for Justice for JESIP identified a number of interesting barriers to interoperability amongst which was the lack of joint training and exercising and knowledge of other organisations way of working (James, 2013).

Interoperability & the Strategic Coordinating Group

The introduction of the SCG framework for enhanced interoperability, resulted in a move from hierarchical structures, characterised by top-down management and command and control relationships (Goldsmith & Eggers, 2004), towards networks characterised by a horizontal style of management, shared leadership and decisions made on the basis of expertise rather than positions. This shift reflected the view that rigid, bureaucratic command and control structures led to an ineffective crisis response; whereas flexible, malleable, loosely coupled, organisational configurations were more effective (Neal & Phillips, 1995).

However, building effective networks is difficult in dynamic environments, especially in response to crisis (Comfort 2002a; Comfort & Kapucu 2006; Waugh & Streib 2006). Network limitations include the difficulties of process, obstacles to performance, and the relationship between bureaucracy and multi-organisational arrangements (McGuire &

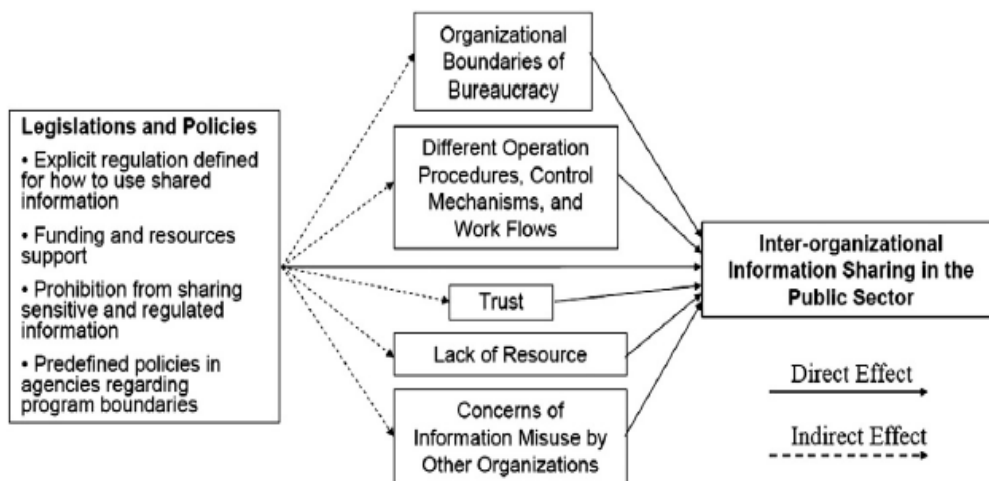
Agranoff, 2011). Not only were such network structures different from bureaucratic hierarchies but they also have different governance structures (O’Toole, 1997). Therefore in considering whether a network, such as the SCG, is effective or not it is important to consider the nature of inter-organisational relationships, which can be affected by problems of control and coordination, communication, and complex individual and leadership behaviours (Kapucu, 2005).

Operational Communication

The JESIP Doctrine states that Local Standard Operating Procedures (SOPs) must include direction that promotes ways of working that allow for integrated effort to take place with partner agencies.

A basic process of inter-organisational coordination is communication (Yamamoto, 1981), which can determine the success or failure of a crisis response (Agranoff & McGuire, 1998). Crisis coordination has been described as the degree to which there are adequate networks for intra and inter-organisational communication to accomplish goals (Dynes & Quarantelli, 1977). Yang and Maxwell (2001) identify a number of barriers to effective intra and inter-organisational communication and sharing of information and as Wheatley (2006) suggests in bureaucratic organisations information flows are strictly controlled and that organisational members (depending on status) often have limited access to information and knowledge (reported Coles, 2014). Figure 2 usefully illustrates some of the relationship barriers to effective communication and sharing of information amongst public sector organisations such as the emergency services.

Figure 2: The relationship Factors that Influence Inter Organisational Information Sharing (Yang & Maxwell 2001)



Therefore creating an effective communication network for emergencies is challenging because it may conflict with the organisational structure developed during routine times (Kapucu, 2006) and complex information makes bureaucratic communication dysfunctional (Brown & Miller, 2000). Manoj and Baker (2007) identify three categories of communication challenges in crisis; technological, sociological and organisational. To overcome these challenges, effective crisis coordination requires interoperability, which is

having appropriate structure and technology that allow agencies to communicate using a common language and system (Kapucu, 2006).

Shared Situational Awareness

JESIP describe shared situational awareness as participants having a common understanding of the circumstances and immediate consequences of the emergency, together with an appreciation of the available capabilities and emergency services' priorities.

It is essential to ensure that local responders have a common and realistic view of the potential disruptions they face, that is, a shared situational awareness (Endsley et al., 2003). Organisations that are crisis prepared recognise the dynamic nature of crises so continuously review their situational assessments and amend them as new information or evidence becomes available (Weick, Sutcliffe & Obstfeld, 1999). They quickly capture and adapt to environmental information through assessment and amend their plans and structures ensuring that all relevant information is shared with others in the organisational system (LaPorte, 2006). However, failure to recognise and act upon early warning signals identified through risk assessments may result in a drift towards failure (Turner, 1976, 1978; Rasmussen, 1997; Woods, 2005).

Organisations that do not have a shared holistic view could be said to have a silo or stovepipe mentality. At an inter-organisation level, silo or stovepipe mentality exists where organisations focus internally and exclude any building of external relationships (Fenwick et al. 2009); whereas, at an intra-organisation level, silo working may result in departmental or personal self-interest taking precedence over the wider organisational goals (Wisner, et al., 2004; Stone, 2004). Harrald and Jefferson (2007) also note that difficulties arise for interoperability in multi-agency teams when personnel move to an environment where team members have very diverse backgrounds, training, goals and cultural norms (reported Coles, 2014:15).

Training & Exercising

A key element of collaborative networks and adaptive capability is having sufficient trained resources. Crises are characterised by disruption and uncertainty affecting the availability of existing organisational resources (Boin & Lagadec, 2000; Pearson & Clair, 1998; Mallak, 1998). Therefore, according to the JESIP Doctrine, all personnel called upon to respond to an emergency situation must be suitably trained and equipped to carry out and discharge the duties they are assigned to.

However, the Doctrine also highlights that many post-event debriefs and inquiries have found specific learning points to improve future response efforts. Single service debriefs and post-event investigations have also indicated the need for internal improvements. The Doctrine describes learning as the process of developing knowledge, skills, attitudes and behaviours. It is therefore essential that lessons identified about joint working, from event or exercise debriefs or other mechanisms, should be captured, assessed, shared and acted upon jointly in order to promote continuous improvement but also to confirm good practice where it is identified. Joint Learning is defined as '*The identification of lessons from exercises or operations that are relevant to joint working and the process of*

effecting and embedding change in organisations and behaviours in response to those lessons’.

As an example of how training and exercising in a role can lead to improved performance, Ginnett (1990) studied aircraft crew and found that three strangers assigned to fly together for the first time quickly became a high performing group. This is because the strong organisational context and previous training surrounding their tasks provided the rules, task definitions, information and resources needed for the group to perform. Consequently they did not need to develop plans, assign roles, determine and allocate resources, resolve conflicts, and set norms as would be expected with a newly formed group. Conversely failure to have clearly defined and understood roles and responsibilities may result in errors and redundant effort (Crichton, et al., 2005; Cotton, 1993). Another solution provided by Ford and Schmidt (2000) is the introduction of ‘*cross training*’ allowing members of one organisation to learn the roles of members of a partner organisation thus facilitating the development of interpositional knowledge which in turn will lead to implicit coordination and greater team adaptability (p 210).

Despite the introduction of the Civil Contingencies Act and the SCG response structure, a recent Parliamentary Report (Ellwood & Philips, 2013) commented that ‘*improving the interoperability of our resilience capability is long overdue*’. The report went on to say that notwithstanding the successful Olympics Games, over the past decade incidents of all scales have demonstrated persistent policy, cultural and technical shortcomings in the ability of different departments and agencies to work together despite the professionalism and dedication of individual staff. Consequently, the government has started looking at the issue of interoperability again

The next section this review provides the details of the analytical lens which will be applied to the JESIP themes in order to identify areas for improvement.

Analytical Lens

This research adopts the concepts of the crisis prone and crisis prepared organisation developed by Pauchant and Mitroff (1992). Between the crisis prone and crisis prepared organisations is a continuum where an organisation’s crisis orientation can be described.

Crisis prone and the crisis prepared organisations exhibit different characteristics (Weick & Sutcliffe, 2001). Prepared organisations are as Weick and Sutcliffe suggest ‘*mindful organisations*’ that invest in both prevention and response capability, whereas crisis prone organisations focus on response, not prevention (Mitroff & Alpaslan, 2003). Moreover, crisis prepared organisations have integrated planning, flexible and adaptive structures and low rationalisation and denial about the likelihood of crises impacting the organisation. In contrast, crisis prone organisations have few, if any, plans, inflexible structures, high rationalisation and denial about the impact of crises on their organisation (Mitroff et al., 1989). Examples of faulty rationalisations that hinder organisational crisis management include ‘our size will protect us’, ‘certain crises only happen to others’ and ‘crisis management and crisis prevention is a luxury’ (Mitroff & Pearson, 1993).

To determine where an organisation sits on the continuum, Pauchant and Mitroff’s Onion Model (1992) identifies four sequential layers of an organisation that can be peeled away.

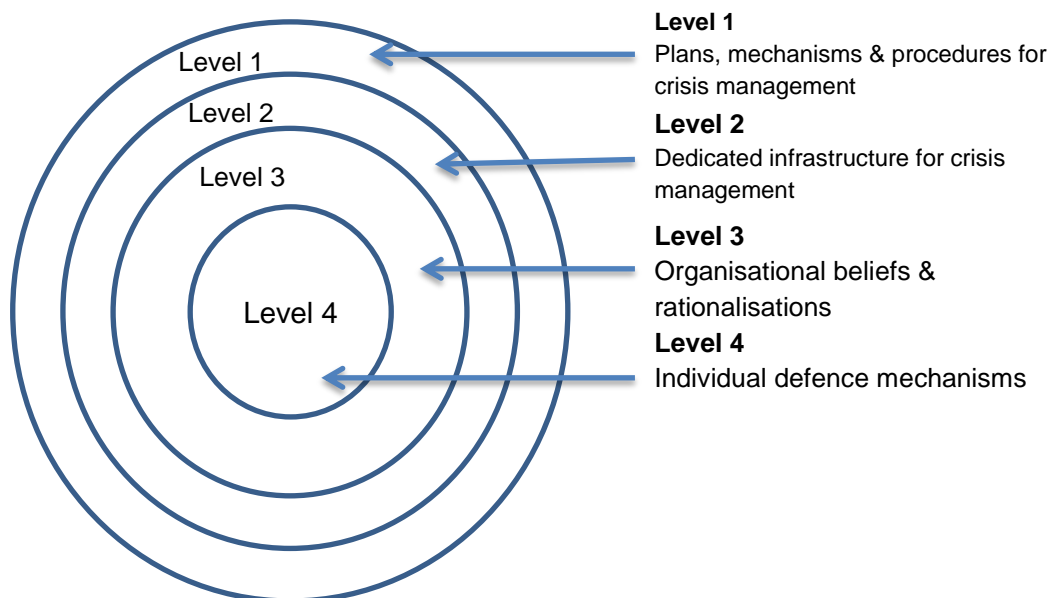
The two outer layers represent the visible elements of the organisation, while the two inner layers represent the invisible and unconscious aspects. The outer layer consists of organisational strategies, programmes and procedures to deal with crises; the next layer is organisational structures, which may or may not inhibit the organisation responding effectively in crisis; then there is the organisational culture layer, consisting of the organisation’s unwritten rules, codes of conduct and beliefs; and the final layer is the core of the organisation, namely the subjective experiences of individuals and their anxieties and defence mechanisms in relation to crises.

The layers are not separate and distinct; rather each layer influences the others. “*The strategies implemented in an organisation influence, and are influenced by, the organisation’s structure and culture and the psyche of individuals*” (Pauchant & Mitroff, 1992: 52). To ensure successful crisis management an organisation must perform well through all layers (Mitroff et al., 1989), namely:

- Level 1: strategies policies and procedures
- Level 2: structure, coordination and communication
- Level 3: organisational culture or norms and practices; and
- Level 4: individual perceptions and beliefs of staff within the organisation

Each will now be considered in turn, in relation to relevant theory and current practice. Figure 3 below illustrates the onion model as conceived by Pauchant and Mitroff.

Figure 3: Onion Model of Crisis Management (Pauchant and Mitroff, 1992)



(Adapted from Elliott et al, 2010)

Level 1:

Strategies, Policies and Procedures

Emergency management extensively relies upon a multiagency collaborative approach (Drabek et al., 1981), the success of which is parallel with the nature and the level of

interdependency among network actors (Kapucu & Garayev, 2011). The interoperability of the emergency response community is vital to the efficiency and effectiveness of the British response capability. But understanding the community and how its component parts need to work together during major incidents is extremely complex (Cole, 2010).

Organisations with limited capacity and capabilities tend to create partnerships sharing resources, information, personnel, finance and expertise (Jordan, 2010; Kapucu & Garayev, 2011). Moreover, in emergency management collaborations authority, leadership, and resources are shared among organisations (Mandell & Keast, 2007). These partnerships are often multi-organisational and cross-jurisdictional resulting in a network approach to emergency management (Weber, 2003). However, they are often criticised on the grounds of slow decision-making, leadership, trust, accountability and performance measurement issues (Ward & Wamsley, 2007).

Crisis management covers activities rooted in organisational structure, culture and policies (Carmeli & Schaubroeck, 2008). However, it is not enough just to have strategies, policies, procedures, plans and structures in place. Effective crisis management must also be embedded in the core organisational values, beliefs and identity, and be reflected in the defensive mechanisms of the organisation. Planning, spending and resourcing on mitigation will be ineffective *“if the espoused resilience culture is only visible within the readily accessible corporate values”* (Elwood, 2009: 247).

In designing emergency response systems the issues that policy makers have to pay attention to are: creating and disseminating incident situation reports; strategic planning; performance monitoring; prioritising response efforts; building group consensus and cooperative behaviour; information and intelligence analysis, control, sharing and dissemination (Chen et al., 2007). Importantly the design and implementation of new procedures following a crisis is indicative of a crisis prepared organisation, which should be able to learn from crises. Mitroff (1988) suggests that crisis management should consist not only of the design and implementation of key plans, procedures and mechanisms to prepare for crises; but having prepared, organisations should have the ability to detect and contain crises when they occur; and finally make a full recovery, including learning from the experience.

However, learning from failure can also go beyond the immediate organisation or system that the crisis occurred in. Toft and Reynolds's (2005) view is that failure in one system or organisation will have the propensity to recur in a 'like' system, which although superficially different, if it contains the same or similar components, it too will be susceptible to common modes of failure. Being aware of the likelihood of common modes of failure in similar systems (or organisations) would enable pre-emptive remedial action to be taken to mitigate potential failure. Elliott et al, (2002) argues that for such an approach to be successful it requires availability of information and a culture that encourages norms and operational practices to be challenged. If such an organisational culture is absent then explicit knowledge or lessons learned from crises will not lead to changed behaviour. In other words learning will not take place.

Organisations that do not recognise and adapt to threats by changing their procedures and policies experience 'failure of hindsight' (Toft, 1992). To avoid these failures,

organisations should learn from their own crisis and the experience of others. Such learning should shape the precautionary norms the organisation has in place and help generate organisational resilience (Smith & Elliott, 2007). In other words the organisation will not just change its processes and procedures at the superficial level of the organisation, reflecting single loop learning. The organisation should experience second or double loop learning. That is embed the lessons identified during the crisis by ensuring that, at both the individual and organisational level, beliefs, values and defence mechanisms are changed to reflect the new understanding of the potential threats now faced and the necessary response capability. These fundamental changes to organisational culture demonstrate that the organisation has actually learned from the lessons identified.

However, learning lessons is one of the most underdeveloped aspects of crisis management (Lagadec, 1997; Stern, 1997) and the challenge is to feedback into pre-existing policy networks and public organisations (Boin et al., 2007). This type of learning is termed by May (1992) as *'instrumental policy learning'* and the degree to which it is achieved depends upon the policy makers appetite for change and the political and other constraints placed on the policy makers at the time (reported Coles, 2014). In reality many organisations do not actually address issues identified as critical during the crisis or post-crisis phase or only deal with the most superficial aspects of technical and procedural matters (Elliott & Smith, 2006a; Birkland, 2009). Instead, organisations produce post-crisis debrief reports which purport to identify lessons learned but which in reality are more symbolic (Clarke, 1999). Another issue here is the loss of organisational memory. Modern working practices involving flexible workforces often mean that personnel move between posts or leave posts quite frequently and take their knowledge and experience with them, also incremental changes to the organisation has resulted in the loss of learning as other issues take priority (Coles, 2014). Further to this Donahue and Tuohy (2006) note that lessons imposed on organisations from external sources are particularly difficult to learn which may become a significant challenge to interoperability.

Level 2:

Structure, Coordination and Communication

Effective cross-boundary governance structures and processes are critical to creating and sustaining interoperable systems. These governance processes must exist outside each participating organisation's traditional bureaucratic structures (Pardo & Burke 2008).

However, the coordination function is increasingly implemented by those who have come to realise the limited usefulness of *"command and control"* (Drabek 2007: 228). While hierarchical communication systems can work efficiently during routine operations, in a dynamic environment such as a crisis they do not (Granot, 1999). A key difficulty with hierarchical command structures is that if top nodes fail, they will isolate large networks from each other (Kapucu, 2006). For example, Dawes et al (2004) argues that the disruption of communications during the initial stages of the response to 9/11 attacks required many to act without information, coordination or leadership. Consequently, the conventional command and control structure used by the emergency services in routine business is inappropriate in emergent environments (Dynes, 1983; 1994, 2003; Neal & Phillips, 1995; Schneider, 1992). Evident in such environments, is likely to be ambiguous

authority and responsibility (Waugh, 2000) leading to use of informal *ad hoc* channels for exchange and communication (Granot, 1999).

For emergency management response organisations, the leitmotif running through all aspects is the 'co-habitation' of the organisations that are expected to interoperate (Noran, 2012). However, one of the greatest difficulties facing the crisis management community arises from the vertical and horizontal fragmentation (McConnell & Drennan 2006), which fosters blocks to crisis planning and response. Horizontal fragmentation is overcome through the development of interpersonal relationships between actors in the first responder community. Vertical fragmentation, however, require more formal solutions that address the organisational and cultural issues presented by different agencies. The response most likely to be successful is one that can use both an informal and formal approach (Thomas et al, 2010).

Emergency response requires an efficient information supply chain for the smooth operations of intra- and inter-organizational emergency management processes (Chen et al., 2008). But the coordination complexity agencies face in creating interoperability appears to increase proportionally with the number of boundaries crossed, the number and type of information resources to be shared, and as the number of technical and organisational processes to be changed or integrated increases (Pardo & Burke, 2008). A position also supported by Yang and Maxwell (2011). Peters (1998) argues that lack of coordination arises from different responsibilities and legal requirements that place significant barriers between organisations. Drennan and McConnell (2007) identify five difficulties: different political control brings potential conflict of agendas and priorities; individual specialisms such as police and health may bring bureaucratic politics and vested interest protection; coordinating non-government organisations such as voluntary services, who may not have been involved in the planning; bringing together organisations with different values, cultures and goals, especially when dealing with private versus public sector; and involving the local communities in pre-planning. These highlight that whilst an integrated approach is attractive, the difficulty in overcoming professional and cultural barriers, as well as confusions over accountability, make it difficult in practice (Ling, 2002). Rosenthal et al. (1991) refer to this as bureau-politics, which in their view will manifest itself in most crises. But Hillyard (2000) argues that bureau-politics can be minimised by establishing a common purpose and culture, together with effective inter-organisational structures with clear divisions of authority; although, for effective coordination, these need to be planned and exercised before they are actually needed (Granot, 1999).

If successful network coordination is achieved it improves organisational resilience and enables network survival, even in "*unfavourable conditions*" (Ehrhardt, et al., 2008: 2). However, to achieve such network resilience the network's member organisations must be capable of understanding the network (Granatt & Paré-Chamontin, 2006). Furthermore, important components of such networks are '*boundary spanners*' who link their own organisation with its external environment, including partner agencies (Burt, 1992; Williams, 2002). Therefore, not only is it important to have shared vision within the organisation to ensure an effective crisis response (Weick, 1993; Horne & Orr, 1998) but commitment and productivity during a crisis will be dependent on relationships (Gittell et al., 2006). Consequently, in complex organisations, such as the SCG, there is a need to

have a common and shared view, which Schien (1996) described as culture, to ensure that the organisation's ability to adapt is not adversely affected by a change in personnel: "...[an] organisation's capacity to maintain itself and grow, to continue to act effectively in the face of changing circumstances, depends upon the creation of a set of shared assumptions that ... survive in spite of changes in individual membership of subsystems, i.e. the culture" (Schein, 1996: 4).

Level 3:

Organisational Culture or Norms and Practices

The effectiveness of an organisation's crisis management is influenced by its culture (Mitroff et al., 1989), which is vital in dealing with crises because no organisation can plan for every eventuality (Sheffi, 2005). Schein (1985) refers to perception in culture as the basic assumptions through which organisational members are taught to see problems.

Pearson and Clair (1998) argue that executive perceptions about risk have a considerable impact on the mind-set of the organisation and its approach to crisis management. Turner (1978) refers to cultural and institutional factors and the danger of vital factors being left outside the organisational perception as causes of disruption. Perception is also an important element for Toft and Reynolds (2005), who suggest that work experiences inform perceptions. In essence, not only does culture define the rules of the organisation but it also reinforces perceptions through its assumptions, understandings and implicit rules which govern workplace activity. Therefore, every organisation is marked by its own distinct internal culture, encompassing philosophy, values, beliefs and assumptions, social structure and artefacts, behavioural norms and expectations (Ott, 1989).

However, there are organisations, such as the military and police, that routinely operate in dynamic and dangerous environments so develop capabilities to manage crises (Flin 1996; Klein, 2001). They recognise the dynamic nature of crises so continuously review their situational assessments and as new information or evidence becomes available assessments are amended or replaced (Weick, Sutcliffe & Obstfeld, 1999). Such organisations have the organisational culture which enables them to switch from routine steady state management where they are controlled by conventional hierarchical authority and standard operating procedures to crisis management where more informal organisational norms including greater latitude in decision making and communication are appropriate (LaPorte, 1996; Reason, 2000; Rochlin et al., 1987).

The reason that the police and the military are able to successfully manage crises rests in three characteristics, namely, safety awareness, decentralisation, and training (Rochlin, 1996). Therefore, leaders of organisations, such as the SCG, should seek to ensure that there is a culture of continuous improvement that recognises that safety awareness is not about preventing isolated failures but rather "...converting these occasional setbacks into enhanced resilience of the system" (Reason, 2000: 770); that for decentralisation staff must have the skills to deal complex task demands in their system (Roberts, 1989); and are trained to be resilient (Flin, 1996; 2006). Moreover, organisations that create an awareness of vulnerability by seeking out signals that may indicate unexpected activity are more resilient (Weick & Sutcliffe, 2001). In such resilient organisations situational

monitoring and reporting is a notable characteristic (Hale et al., 2006). Being able to interpret the weak signals and to gain an understanding of what it means has been described as situational awareness (Endsley et al., 2003). Failure to heed these signals may result in the incubation of crisis (Turner, 1976) and drift towards failure (Woods, 2005).

Salas and Cannon-Bowers (1995) found that high performance teams monitor their own performance and remain self-critical, correcting and adjusting their methods as necessary. Therefore, the SCG should continually re-assess its performance against the crisis. In other words continually review its shared situational assessment.

Leadership

A key component in establishing a crisis prepared culture within an organisation is leadership (Smits & Ally, 2003; Smith, et al., 2005; Sheffi, 2006). An important responsibility of organisational leaders is to 'institutionalise' crisis preparedness throughout the organisation (Kelly, 2007). However, leadership is a socially constructed concept (Grint, 2005) and what is considered effective in one organisation may not be in another.

Importantly, there are two fundamental assumptions of traditional leadership literature (Huxham & Vangen, 2000) that do not apply to collaborative settings of the SCG. First, a leader cannot exert formal authority based on hierarchical rank because the individuals involved are from different organisations. Second, it is very difficult to agree upon a common goal because participating organisations have different missions and priorities. Therefore have conflicting goals. Consequently, leading a group of interdependent organisations to create interoperability requires a different set of skills than those required in traditional bureaucratic organisations. Network leaders require boundary spanning skills, which according to Kapucu (2006), primarily means being able to understand where their organisation sits within the external operating environment and being able make decisions regarding information.

Decision Making

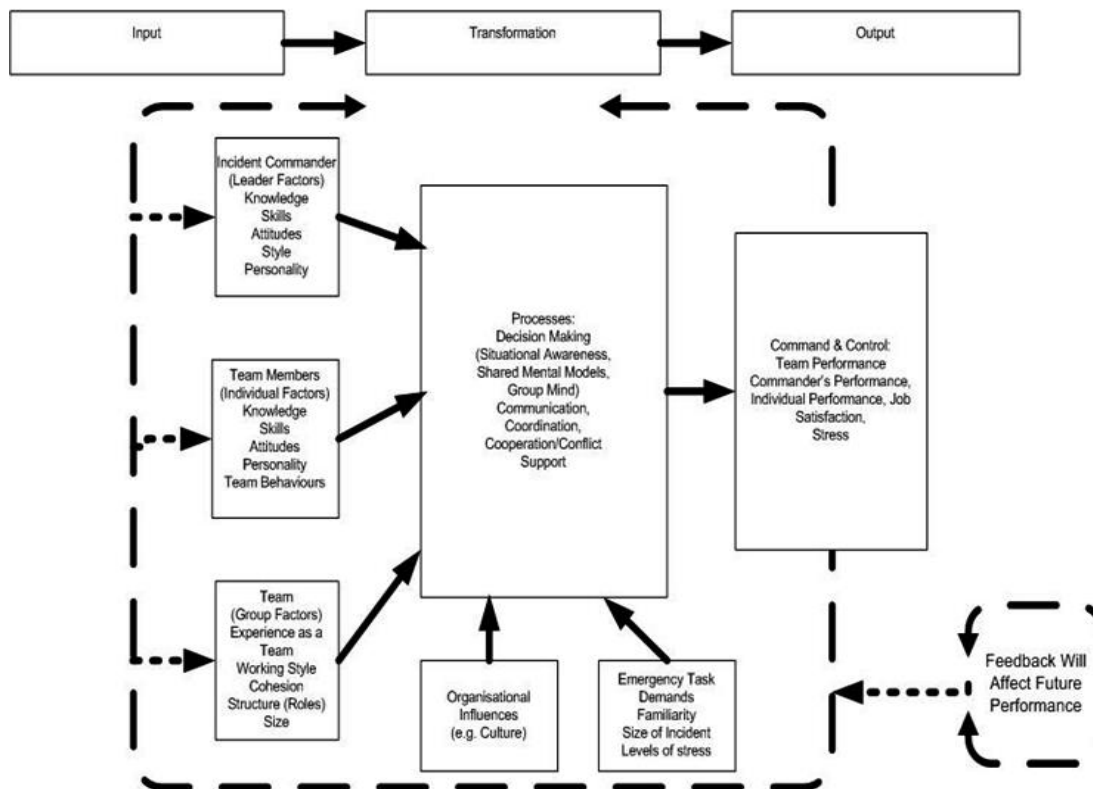
The context for crisis decision making within the SCG is characterised by time pressure, uncertainty, ill-defined goals, high personal stakes, and other complexities (Orasanu & Connolly, 1993; Lipshitz, et al 2001). However, Eisenhardt (1989) found those with deep knowledge of their business can maximise decisions within time constraints by considering several alternatives simultaneously, especially when the entire team was conditioned to work with each other in turbulent situations, like SCG members who regularly come together in both routine and crisis response.

It should be noted that there are several models of decision making and each is based on a different set of assumptions (Kreitner & Kinicki, 2001). Moreover, values are subjective and people vary in their preference for safety or risk when making decisions (Melers et al, 1998). Simon (1957; 1979) highlights that, in reality, decision makers' experience '*bounded rationality*'. Examples include the limited capacity of the human mind, problem complexity and uncertainty, amount and timeliness of information at hand, criticality of the decision, and time demands. Consequently, Simon (1979) suggests that decision making

is characterised by the limited information available to the decision maker, that to simplify complex situations decision makers will make use of heuristics and draw on previous experience or training, and that rather than make optimal decisions will *satisfice*. That is, choose a solution that meets a minimum standard of acceptance; one that is 'good enough' rather than optimal.

Flin (1996) combined components of group behaviour (McGrath, 1984) and decision making (Klein, 1995; Orasunu, 1994; Salas, Cannon-Bowers & Blickensderfer, 1995). This is illustrated on the following model of command team performances in emergencies.

Figure 4: Model of Command Team Performance in Emergencies (Flin, 1996)



The three elements which echo SCG decision making are: first, the input factors comprising of the leader, team and team characteristics, together with the context including organisational culture and task demands; second, transformation processes such as decision making, communication and coordination; and third, output resulting from the combination of the other elements. Notably, a key part of Flin's model is the feedback loop which will improve future performance.

In terms of actual decision making in crisis, Klein (1993) found that incident commanders concentrated on assessing and classifying the situation and once they had done that they applied a typical response from their previous knowledge. Klein (1995) developed this into the Recognition Primed Decision Making Model, which consists of three stages. First, the decision-maker recognises the type of situation knows the appropriate response and

implements it. Second, if the problem is more complex the decision maker will consider several interpretations based on a situational assessment before deciding. Third, in cases when the decision maker is less sure of the option before an action is implemented a mental evaluation will be undertaken to determine its viability (Klein & Crandell, 1995).

Grint (2005) describes a similar process of moving from command, which is enforcing the answer on followers because the leader has the power and resources to deal with the problem, through management of the problem by organising the processes needed to resolve it, to finally displaying a more sophisticated level of leadership by asking questions of others. Grint (2005) argues that as leaders move along the continuum towards problems of increasing complexity they need to be more collaborative. In other words, as the certainty of the resolution decreases the need for collaboration increases. Given the nature of crises that the SCG is activated for, it is collaborative decision making that is appropriate for its activities.

Another aspect which may influence the SCG decision making performance is status, which tends to be derived from one of three sources: the power a person wields over others; a person's ability to contribute to a group's goals; and an individual's personal characteristics (Feldman, 2001). High status individuals are often given more freedom to deviate from norms than are other group members as long as the activities are not severely detrimental to group goal achievement (Robbins, 2005). Status also influences group interaction. High status people tend to be more assertive, speak out more often, state more commands, and interrupt more often. This can stifle creativity as lower status members tend to be less active participants in group discussions and their expertise may not be fully utilised. Therefore, to be effective the decision making group will require to be genuinely collaborative, ensuring reciprocity and equal representation to engender participatory decision making (deLeon & Varda, 2009).

Effective crisis coordination, therefore, requires a participative and consensual approach to decision-making. This is reflected in the structure of the SCG, which is capable of not only coordination but also resolving jurisdictional disputes and reducing duplication of efforts: *"...[T]he coordination model is becoming more popular than the traditional command and control structure...The coordination model is also often better for negotiating turf battles among agencies and nongovernmental organisations providing overlapping services"* (Haddow & Bullock, 2003: 88).

Level 4:

Individual Perceptions and Beliefs of Staff within the Organisation

Cultural changes must be made to operational guidelines to facilitate interoperability between individuals and agencies (Barbera & Olson 2004). It is unreasonable to expect that responders can merely be told to cooperate in order to achieve interoperability. Before a disaster occurs, participants from all relevant agencies must work together, building relationships and trust. Joint training through exercises and simulations, reaching across domains, are useful in developing a culture of interoperability (Thomas et al, 2010).

A key element of collaborative networks and adaptive capability is having sufficient trained resources. Crises are characterised by disruption and uncertainty affecting the availability of existing organisational resources (Boin & Lagadec, 2000; Pearson & Clair, 1998; Mallak, 1998). According to Weick (1993), if everyone knows the roles and responsibilities of all in the partnership, resilience will be enhanced because even in the event of a crisis the role system remains intact in the individual mind. He referred to this as a *'virtual role system'* (Weick, 1993). Dynes (1986) suggest that crises provide the best opportunity to examine the functioning of roles. Likewise Smith (2005) comments on the importance of crises in assessing team performance; but highlights that such teams must have experience of working together and trained in advance to be effective in containing a crisis.

Importantly the legitimacy of the rules determines whether an organisation is crisis prone or crisis prepared (Hynes & Prasad, 1997). Therefore, the means by which rules are introduced and enforced influence how managers and workers respond to them (Elliot & Smith, 2006). For example, in a study of a police organisation it was found that top management was unable to impose organisation-wide conformance with the traditional command bureaucracy because of resistant subcultures in the organisation. This was described as a mock bureaucracy, that is, *"an organisation with a counterfeit front deceitfully designed to impress key stakeholders with appropriate principles and well-ordered practices, while hiding internal fragmentation and ad hoc operations"* (Jermier et al., 1991: 189). Hynes and Prasad (1997) argued that the formal rules were subordinate to the workplace norms. Moreover, they considered that *"the development and enactment of mock bureaucracies can have serious consequences for organisations, and can easily precipitate industrial crises"* (Hynes & Prasad, 1997: 606). Further to this Schein (1996) highlighted what he called the three cultures of an organisation (executive, managerial and operational cultures) which must be aligned in an adaptive, flexible organisation. In command and control structures this perspective supports the views expressed above.

This highlights the importance of organisational culture in achieving and maintaining compliance through shared values embedded at an individual and organisational level. This requires mutual trust.

Trust

Cooperation requires trust between the networks participants, which Granovetter (1985) argues is most effective at an individual rather than institutional level. The cooperation enhances the organisational development of knowledge (Johanson & Mattsson, 1993) and strengthens individual capabilities, as well as their organisations (Cohen & Levinthal, 1990). As a prerequisite, trust must be established among emergency response agencies before they share information. A lack of trust may impede information sharing in a collaborative system (Karahannas & Jones, 1999). Therefore, trust is a key element of a successful network. Conversely Yang and Maxwell (2001) suggest that members' beliefs toward intra organisational information sharing can be mediated by self-interest and cost–benefit analysis, information ownership as opposed to stewardship, and the notion of reciprocity, getting something back for what is given.

Trust is defined as the *"accepted vulnerability to another's possible but not expected ill will (or lack of good will) toward one"* (Baier, 1986: 235). Trust involves a cognitive leap

beyond the expectations that reason and experience alone would warrant. Moreover, it is reciprocal, so when people see others acting in ways that imply that they trust them, they become more disposed to reciprocate by trusting them more. Conversely, people come to distrust those whose actions appear to violate their trust or to distrust them (Lewis & Weigert, 1985). Bartolme (1989) offers six elements for building and maintaining trust: communication (keeping people informed, giving honest and candid feedback); support (through being available and approachable); respect (by delegating and actively listening); fairness (by giving credit and recognition where due); predictability (being consistent); and competence (by demonstrating ability and professionalism). These are essential because trust is a notoriously vulnerable good, easily wounded and not at all easily healed (Baier, 1991).

In addition to establishing trusting relationships, understanding the dynamics of the inter-organisational networks and the patterns of interaction are important for both policy makers and those responsible for implementation (Gidron et al, 1992). Networks are characterised by mutuality, complementarity, reciprocity, conflict and collaboration and these exist within the totality of connections between various participants (Knoke & Kuklinski, 1993). The effectiveness of such networks is dependent on the personnel working within the system having a clear understanding of the various inter-organisational relationships and how these affect outcomes. Having such an understanding enables personnel to adapt their activities to ensure they are appropriate to achieve the desired outcome such as resilience.

Waugh and Streib (2006) link performance with comprehension. They state: “*improved performance depends to a great extent on the ability of public officials to fully comprehend the complexities of the policy networks operating in the areas in which they work and to think strategically about how to use or alter them*” (Waugh & Streib, 2006: 138). Understanding the network and thinking strategically enables members to jointly consider challenges and create solutions, within their own individual and collective capabilities. Key to this activity is the reciprocal knowledge inherent within network relations. The benefits include increased knowledge, research and innovation; and these justify the continued participation of members within the network. Therefore networks not only integrate diverse and disparate pieces of new knowledge but “*allow the combination of different kinds of expertise*” (Alter & Hage, 1993: 28). So not only is the interaction between networks an adaptation process it is also a learning process (Johanson & Mattsson, 1993).

All parties involved in a crisis must not only be trained to a high level of proficiency in their given field, but must also possess awareness of the other responders. Therefore, training should encompass all aspects of crisis planning, response, recovery, and mitigation (Tierney 2007). The most common means of training UK emergency services is through simulation and role play exercises (Borodzicz, 2005). Such exercises help individuals develop personal skills specific to certain types of incidents (McDonald et al., 1992). They have also been recognised as a means for multi-agencies to practice together in a less stressful environment (LESLP, 1992). However, crisis requires a level of flexibility in management and decision-making skills distinct from problems associated with ordinary events, so in relation to training ‘clarity of goals’ is essential (Turner, 1994a; 1996). Furthermore, because of the unique nature of crises, innovation and creativity are critical

skills for crisis response (Kendra & Wachtendorf, 2003; Hamel & Välikangas, 2003). Weick (1993) opines that improvisation and bricolage are important elements of resilience. He suggests that *bricoleurs* are able to remain creative under pressure because they routinely act in chaotic conditions. Therefore, they are able to improvise and create solutions with available resources. Those that are successful have a high adaptive capability and are able to cope with change and respond to it quickly and effectively (Denevan, 1983). Such adaptive learning centres on the ability of an organisation to change simultaneously and align itself with its environment (Daft & Weick, 1984; Murray, 2002).

Effective training must also have clear goals, be relevant, reflect current practice (Roffe, 1997; Storr & Hurst, 2001; Fox, 2002), and incorporate critical self-reflection (Farrugia, 1996). Not only will organisational culture and the environment have a strong influence (Fredrickson & Monsen, 1999), so will the individual's confidence and motivation (Blair, 2003; Seifert, 2004). More important, though, is ensuring participants are actively involved in the learning process. This allows them to build on their experience and discover the usefulness of the skills themselves (Hickie & Sawkins, 1996; Hughey & Mussnug, 1997). To enable this it is argued that effective crisis training should be inductive rather than deductive (Ford and Schmidt, 2000), modelled on ill-structured and complex events, so participants experience tension, uncertainty, time pressure, a sense of inadequate information and the frustration they would in a genuine crisis (Turner, 1978; Gredler, 1992).

However, it is important to recognise that simulations are not self-teaching (Gillespie, 1973; Petranek, 2000). In addition to realistic crisis simulations, critical feedback is essential to improve training (Black & William, 2002; Schunk, 1990). According to Flin (1996) feedback is important for increasing self-awareness, developing meta-cognitive skills and improving leadership capability. Thus procedures should be developed to include feedback from trainees, which reflect quality, effectiveness and performance in relation to learning outcomes (Glasner, 1997). What is needed is the proclivity to analyse the performance of the organisation in reacting and responding to the events that it tackles, and an inbuilt self-critical learning process whereby mistakes in the past are used constructively to inform future policy shifts and operational arrangements (Penning-Rowsell, 1996).

Conclusion

Some Concluding Thoughts

The key to successful crisis management and response is the creation of cross-discipline and interagency integrated response (Thomas et al, 2010). However, the SCG is a heterogeneous organisation involving public, private and voluntary organisations. Coordinating a response is, therefore, a challenge because of the uncertainty as to the cause of crises, time pressures and confusion about who should make decisions (Brecher, 1979; Drabek, 1985; Janis, 1989).

Achieving an integrated approach is difficult in practice because of the fragmented nature of UK political systems and the spread of political decision making authority over different levels of government (Drennan & McConnell, 2007). Barriers include professional and

cultural challenges and confusion over accountability (Ling, 2002). Moreover, bureaucratic organisations are not well designed to manage threats that emerge rapidly in unforeseen and often undetectable ways (Boin et al., 2010). To overcome such challenges it is suggested establishing a common purpose and culture (Hillyard, 2000) and exercising them before they are needed (Granot, 1999).

For an organisation to be truly crisis prepared its crisis management activity needs to reach beyond the superficial aspects of the organisation through to its core identity and defence mechanisms. This requires an organisational culture which values crisis management activities, together with leadership which proactively promotes them throughout the organisation, ensuring the appropriate arrangements and resources are in place before a crisis occurs.

Clarity of roles and responsibilities and awareness of the SCG processes and channels would enable responders to act cohesively without pre-relationship and enhance resilience (Ginnett, 1990; Weick, 1993; Smith, 2005).

It is considered essential that local responders have a common and realistic view of the potential disruptions they face, that is, a shared situational awareness (Endsley et al., 2003). Crisis prepared organisations are those that quickly capture and adapt to environmental information through assessment and amend their plans and structures ensuring that all relevant information is shared with others in the organisational system (LaPorte, 2006).

Failure to recognise and act upon early warning signals identified through risk assessments may result in a drift towards failure (Turner, 1976, 1978; Rasmussen, 1997; Woods, 2005).

Moreover, that the organisational leadership is ready to lead an organisation through crisis and ensure that the organisation as a whole learns from the experience. However, there are organisational, structural and political challenges to ensuring that organisations are able to learn lessons.

The JESIP Interoperability framework addresses the key issues. However, it remains to be seen whether 'in practice' it reaches into the cultural and individual belief levels necessary to ensure that the SCGs shift along the crisis-prone-prepared continuum.

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