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Learning the Lessons from Major Incidents: A Short Review of the Literature

Eve Coles
Visiting Fellow in Civil Protection
Emergency Planning College

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For further information, including a submissions guide for those who wish to submit a paper for publication, please contact:

Mark Leigh

Emergency Planning College

T: 01347 825036

E: mark.leigh@emergencyplanningcollege.com

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1 Executive Summary

This short review of the literature on organisational learning from crises and emergencies has been commissioned by the Cabinet Office Civil Contingencies Secretariat to support the ongoing work being undertaken by the Joint Emergency Services Interoperability Programme (JESIP). It is not a definitive review of all the literature in the area but simply an indication of what the current research is saying with regard to the universal problem of 'learning the lessons'. Nevertheless many documents have been read, ranging from doctrine and guidelines to research papers (57 of which are referenced in this paper) in an attempt to identify why it is that we continually fail to convert 'lessons identified' from emergency response into embedded 'lessons learned'.

Consideration was given to how learning may or may not take place at a macro (national or state) level, an organisational level and an individual level, and it became increasingly apparent during the preparation of this paper that this is a complex area of interdisciplinary theory and research that draws on many different fields. Consequently the review is structured thematically, closely following those themes that have emerged as the literature was surveyed. These are;

- Introduction: back ground to the research and the problem of learning lessons from major emergencies
- Turning lessons identified into new policy and doctrine: Policy learning and change at the macro (national or state) level
- Organisational learning from crises and emergencies: problems and issues associated with learning at the organisational level and the significance of single loop and double loop learning.
- Information management and sharing: issues associated with the dissemination of information and learning from emergency response at an intra-organisational level and an inter-organisational level
- Why we find it so hard to learn the lessons of experience.
- Individual learning: a review of some barriers to individual learning and the meta-cognitive skills needed to ensure the learning of lessons
- Team learning: Development of team knowledge and the issues raised for *ad hoc* multi-agency teams in emergency response
- Culture and organisational learning and change: the importance of organisational culture and change management with regard to learning lessons
- Conclusions and recommendations: drawing together the themes of the review and proposed further work.
- References: list of sources cited in the review

Several issues have emerged with regard to failure to learn lessons, these include inadequate communications, poor dissemination information both within organisations and between them, underdeveloped shared situational awareness particularly in *ad hoc* team situations and the un-willingness of individual organisations to test their assumptions about the way their operational partners will respond in emergencies. Added to these issues are also the loss of organisational memory, denial and complacency, loss of opportunity and lack of retention of knowledge and skills, an inability of organisations to develop double loop or higher level learning and a focus on what to learn rather than how to learn. Fundamental to these issues and where the research ultimately

focuses is on organisational cultures, the way individuals learn and the lack of change management programmes.

A number of conclusions and recommendations have been drawn from the survey including;

- more attention to learning lessons must be included in the doctrine that guides the way we deal with emergencies
- the emergency services need to examine the way in which they manage, use and share information both internally and externally organisational assumptions regarding dissemination of knowledge and information tested to the limit.
- the emergency services should test their 'taken for granted' assumptions regarding the learning of lessons and adopt an explicit strategy to learn and change
- provision should be made for the capture of and retention of organisational memory and the management of knowledge within systems that are interoperable.
- an understanding should be developed of how organisational culture can inhibit learning and how a deep level commitment to change that is transitional rather than incremental and developmental can be achieved
- an evaluation of current training practices that will allow a better understanding of how learning sciences can improve retention, develop metacognitive and team skills that will enable members of ad hoc multi-agency teams to interact in an effective way
- more funded research to develop a body of knowledge other than doctrine that can provide the evidence base for the translation of learning and improved practice from strategic to operational level.

What is striking from this review of the literature are the many reasons why we don't convert 'lessons identified' into 'lessons learned'. This short review highlights some of the key issues in this respect and offers some early remedies as a first step towards a more effective emergency response.

2 Introduction

This paper is a short review of the literature on organisational learning from crisis and emergencies. It is not meant to be a definitive review of all the literature but simply an indication of what the current research is saying with regard to the universal problem of 'learning the lessons'. It is mainly concerned with the learning that happens at the sharp end of response[1] in particular with those emergency responders and their organisations that are first on the scene and subsequently with the learning that takes place within the command and control structures that are implemented to deal with major emergencies. It is well documented that the same mistakes are repeated time and again when responding to major emergencies (see for example Easthope, 2007; Pollock, 2013). A case in point is the failure of communications between over ground responders and those working underground in both the Kings Cross Fire of 1987 and the 7/7 bombings in London some 17 years later in 2007. Technical recommendations with regard to communication systems made by the Fennel Inquiry in 1987 had not been fully implemented by 2007, resulting in much the same problems arising from both events.

Converting 'lessons identified' to 'lessons learned' is a 'thorny' problem that is by no means unique to the UK and one that has exercised the minds of governments and the military, practitioners and academics alike for at least the last 30 years or so. Much of the literature surveyed has a United States (US) focus which served to emphasise the lack of research and a body of knowledge in this area pertaining to the United Kingdom (UK). Whilst this is not necessarily an issue and 'lessons' noted are in the main generalisable, the US does have a significantly different response system to the UK and anecdotally evidence seems to suggest that responders would find it easier to relate to our own particular body of knowledge.

Before an investigation of the reasons for not converting lessons identified into lessons learned is attempted a definition of 'the problem' needs to be established. Pollock (2013) in his work on persistent lessons identified by public inquires notes the following common causes of failure;

- "Poor working practices and organisational planning
- Inadequate training
- Ineffective communication
- No system to ensure that lessons were learned and staff taught
- Lack of leadership
- Absence of no blame culture
- Failure to learn lessons
- No monitoring/audit mechanism
- Previous lessons/reports not acted upon"

If these are persistent lessons identified then clearly 'the problem' would seem to be the inability of all stakeholders from government to operational personnel to apply rigorous analysis and diagnosis

[1] 'the sharp end of response' specifically refers to those front line operational personnel who are literally the first on the scene of an incident and may temporarily act as 'on scene commanders' or 'operational commanders' until such times as a command and control structure has been established.

of lessons from previous response to emergencies and effect and embed meaningful change for improved practice.

Similarly, the literature suggests several reasons for 'the problem' ranging from loss of corporate memory, denial and complacency in organisations to the lack of resources or the political will to change. Furthermore at the sharp end of response issues such as communications, information sharing, shared situational awareness and the un-willingness of individual organisations to test their assumptions about the way their operational partners will respond are also prominent in the literature. Other issues raised include problems with transferring learning from training to real world situations because of the lack of opportunity to practice which can eventually lead to the loss of knowledge and skills over time and also an inability to dig deep into the psyche of the organisation to identify the real underlying and root causes of the failure to learn. That said the research ultimately focuses on organisational cultures, the way individuals learn and the lack of change management programmes as fundamental reasons for the inability to learn from past mistakes. It is a complex area of interdisciplinary theory and research but one that needs to be investigated and fully understood to provide the evidence base for better practice. A cautionary note here is that most of the literature identifies the lessons to be learned and the barriers to learning but very few actually provide suggested concrete solutions for how to learn them. This paper will consider how learning may or may not take place at a macro (state) level, an organisational level and an individual level.

3 Turning Lessons Identified into New Policy and Doctrine

At a policy level the very existence of the Joint Emergency Services Interoperability Programme (JESIP) is perhaps evidence of learning taking place, certainly it demonstrates an *appetite* to reflect learning in operational practice. As Birkland (2006) points out it is only when coalitions of politians, professionals, experts and advocates are 'energised' by an event that the exchange of opinions, ideas, beliefs and theories are initiated in an attempt to remedy any policy/doctrinal failure that evidence of learning is demonstrated at this level. Quite clearly this suggests that what happened in policy terms after the events of 2000 and 2001 in the UK and the 9/11 terrorist attacks in the USA, Bali and Madrid as well as from the floods of 2007 and the 7/7 bombings was a degree of learning. The introduction of the Civil Contingencies Act 2004 (CCA 2004) and its associated statutory and non-statutory regulations and guidance which have been further supplemented by a plethora of other doctrine from government and Category 1 responders does demonstrate this to a certain extent.

It is however the degree to which instrumental policy learning and change[2] has taken place that is important. As early as 1992 May identified two significant impediments to instrumental policy learning from disasters. Firstly, "what it takes to improve policy performance" in other words how bad does it have to get before policy is reviewed and changed, and secondly where knowledge for improving policy performance exists, but policy makers are constrained by political or other factors in their abilities to incorporate such change in policy redesign" (p349).

[2]Instrumental policy learning and change is about the "viability of policy interventions". For example when new guidelines or doctrine undergo a period of consultation or when established regulations, doctrine or guidelines are reviewed for effectiveness and/or updated as a result of new knowledge or experience. (The review of Emergency Preparedness and Emergency Response and Recovery are a case in point).

As an example during the 1980s also known as the *Decade of Disasters* (Parker and Handmer, 1992) and the early 1990s emergency planning was subject to two reviews within close succession. The first review in 1989 did little to allay the concerns of those involved in emergency management (Coles 1998) and as Parker and Handmer (1992) noted *" the British approach is characterised by a lack of policies, especially explicit national policies providing unambiguous signals."* The second review in 1991 was carried out after the newly appointed Civil Emergencies Advisor produced his first report and called for amongst other things for a statutory duty to plan for peacetime emergencies, the government at the time however did not implement the recommendations of their advisor (Coles, 1998) as Parker & Handmer (1992) again note emergency management was pushed down the political agenda because of more pressing political issues at the time. Thus it is suggested here that until the statutory duty to plan for peacetime emergencies was introduced in the CCA 2004 such factors identified by May were apparent in the way policy was designed and implemented in the UK. Many lessons were identified throughout the last decades of the twentieth century but in terms of constructive instrumental policy change very little happened.

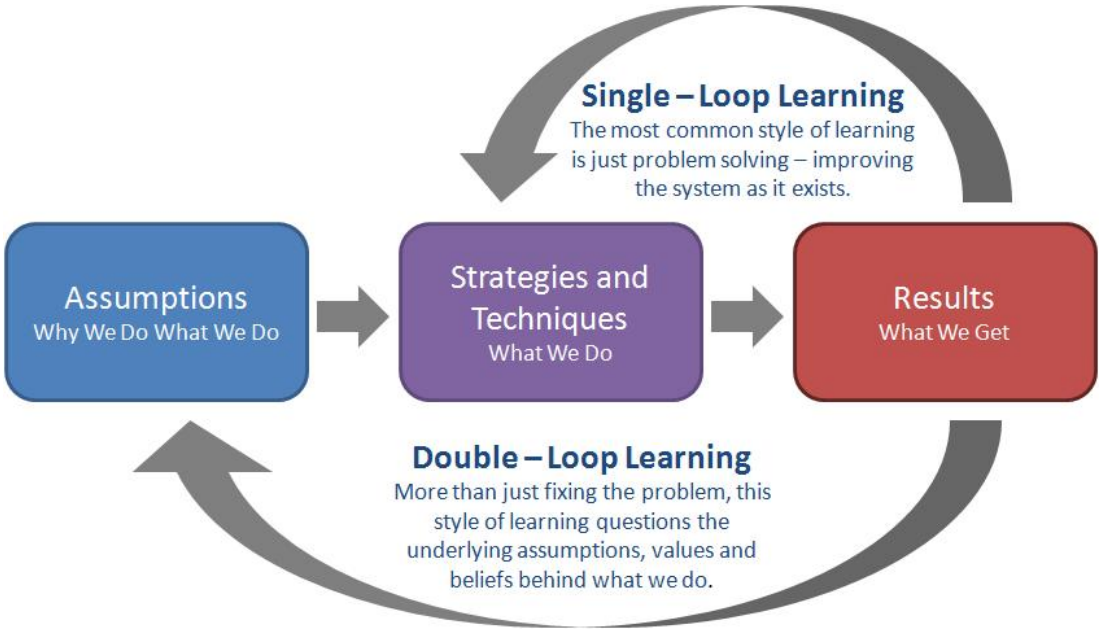
It is important to note here that policy change is not always for the good, there may be extreme pressure to act quickly to produce new or changed policy as a result of some event that is *not objectively related to the actual problems revealed by the eve*nt (Birkland, p17). May (1992) calls this type of policy change without detailed assessment or analysis, *"superstitious instrumental learning"* noting that such change can have a negative effect at operational level. That said if the same mistakes in the emergency response are continuing to be made despite what appears to be some constructive learning at a policy level, it seems that the real issue then is how to translate policy level learning into organisational and individual learning. Perhaps this is where the first failure to learn the lessons comes in the UK system. As mentioned above there is a plethora of guidance and doctrine which creates a complex picture for response but added to this is the less than robust way the doctrine treats the issue of learning lessons and as an example *Emergency Preparedness (2012), Emergency Response and Recovery (2012)* and the *NPIA Guidance on Command and Control (2009)* all fail to give real credence and space to the problem, a point also made by Crichton *et al* (2009). All three note that lessons should be identified and learned but appear to make assumptions (action plans and implementation reports) with regard to how learning is achieved.

4 Organisational Learning from Crisis and Emergencies

Organisational learning from crisis and emergencies has been the subject of much academic research (Dodgson, 1993, Kletz, 2001, Smith & Elliott 2001, Toft and Reynolds 2004, Smith & Elliott, 2006, Cooke & Rohleder, 2006, Weick & Sutcliffe, 2007, The World Bank, 2012, Sanderson *et al*, 2012) each of which list a number of different barriers to learning. Toft and Reynolds (2004) for instance, highlight the loss of organisational memory, ignoring advice (a significant issue in the Piper Alpha disaster), poor internal communications, information management and information sharing, interpretation of regulations, deviant behaviour such as rule breaking which if persistent over time can lead to bad practice becoming accepted practice (BP's problems over the last few years are significant here), lack of training, poor supervision and cost implications. Others (Vaughan, 1996, Starbuck & Farjoun, 2005, Haddon-Cave 2009) suggest that organisations can fail to appreciate a sense of their own vulnerability, (a criticism that was levelled at NASA after the shuttle disasters) and that hazard and risk assessments are not always timely or indeed valid (see for example The Nimrod Review).

Another significant problem that has been highlighted in the research (Argyris, 2001, Argyris and Schön, 1978 Senge, 1990, Reason, 1997, Schein, 2000, Smith & Elliott, 2001,) is the apparent inability of organisations to firstly make a distinction between single loop and double loop learning (see Figure 1) and secondly to develop systems to ensure the necessary cultural change to embed learning. Choularton (2001) states that superficial or single loop learning (first order learning) can be demonstrated for instance when organisations address the immediate causes of failure. In response terms this could be by creating new operating procedures or introducing new equipment to remedy a problem, it is a palliative method that treats the symptoms of failure rather than the cause. Double loop learning on the other hand requires organisations to drill down and look for the recurring, often systemic failures and the values that govern such behaviour and by changing these before action may be said to have achieved second order or higher learning (Argyris 2002).

Figure 1: Single and Double Loop Learning (Bryant 2009)



A very early study by Argyris and Schon (1978) found that most organisations do quite well in single-loop learning, but have great difficulties in double-loop learning. Their contention is that organisations ordinarily fail to learn on a higher level. Further studies (1993, 1996) highlighted one reason for this being that organisations and individuals are not only *blind* to their incompetencies they are also unaware that they are *blind* and this creates what they describe as inhibitory loops. Primary inhibitory learning loops are a self-reinforcing cycle in which errors in action provoke Individuals to behaviours which reinforce those errors. Secondary inhibitory loops are group and inter-group dynamics which enforce conditions for error (ambiguity, vagueness, etc.). They contend that organisations tend to create learning systems that inhibit the double-loop learning that would call into question their norms, objectives, and basic policies. They further argue there is a gap between actors' rationalised statements of what they do and what actually occurs in reality.

Organisations use defensive reasoning to prohibit questioning and produce *"self-fuelling processes that maintain the status quo, inhibit genuine learning, and reinforce the deception"* (p213). (also see section 8 below, *Theories in Use*)

Major emergencies in the UK are relatively rare events and as such provide few opportunities to gain from real experience in order to respond better next time. Toft and Reynolds (2005) note that such experience can embed learning for those involved but because of the rarity of the events that learning is lost as personnel move on and leave the organisation for one reason or another. They also suggest that this loss of organisational memory is not because those involved in an event have forgotten their learning (although time can dim the memory) but that the dissemination of the lessons beyond those directly involved has not taken place, in other words the information has not been shared appropriately. As early as 1980 Kletz highlighted what he called 'organisational forgetfulness' and re visited the same problem 13 years later in 1993. He concluded by saying that no one knew when and why the lessons had been forgotten but suggested that over time incremental changes to organisations could see the learning relegated as new issues take priority. The notion of organisational memory is also considered by Fischbacher-Smith & Fischbacher-Smith (2009) who point out that; *"If organisations are to learn, they must first remember both the events and the situational context in which they occurred as well as the responses made at the time by 'management'."* (p 465). A solution to the loss of corporate memory suggested by the Health and Safety Laboratory (Gadd *et al* 2005) is to capture the learning though a robust knowledge management system that is easily accessible and that the data contained within it is easily retrieval.

5 Information Management and Sharing

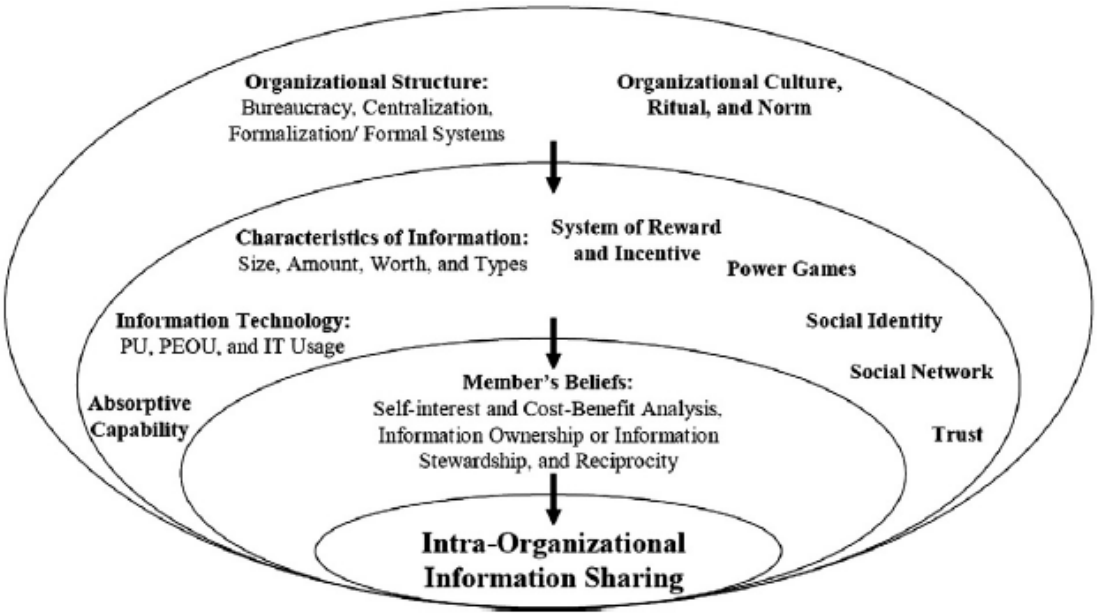
The management and sharing of information in the response phase of an emergency is critical in determining the coherence and success of a multi-agency response. As mentioned above many commentators (Kletz, 1993, 2001, Toft & Reynolds, 2004, Weick & Sutcliffe, 2007) agree that the dissemination of lessons and the actions needed suggest that information management and sharing is similarly important when addressing the need to learn lessons, however the way in which information is managed and shared on an inter-personal, intra-organisational and inter-organisational basis can present problems and inhibit learning.

Yang and Maxwell (2011) note that individual behaviour in information sharing can be complex and depend upon a number of different factors. These factors include a willingness to share information, motivation, a perceived need to share, perceived trust and privacy, channels for sharing information and contextual and relationship factors. They also suggest that in the organisational context information can be seen as a component of power and as such a symbol of power and identity which can lead to a reluctance to share.

Intra-organisational information sharing adds another layer of complexity to the way organisations learn. Wheatley (2006) suggests that in bureaucratic organisations information flows are strictly controlled and that organisational members (depending on status) often have limited access to information and knowledge. Yang and Maxwell (2011) describe the various factors that can influence organisational information sharing stating that it is a complex picture and that each factor can influence the other. Principal influencers amongst these variables are organisational structure, organisational culture, rituals and norms. Figure 2 demonstrates the layered influence of these

different factors. The system of reward and incentive, power games, social identity, social network, and trust are factors comprising the second layer that can be formed and influenced by organisational structure and organisational culture, and they can influence members' beliefs in intra organisational information sharing. Similarly, the characteristics of shared information, the adopted information technology (perceived usefulness and perceived ease of use), and the absorptive capability also affect members' beliefs. While influenced by the factors in layers one and two, members' beliefs toward intra organisational information sharing can be developed and 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.

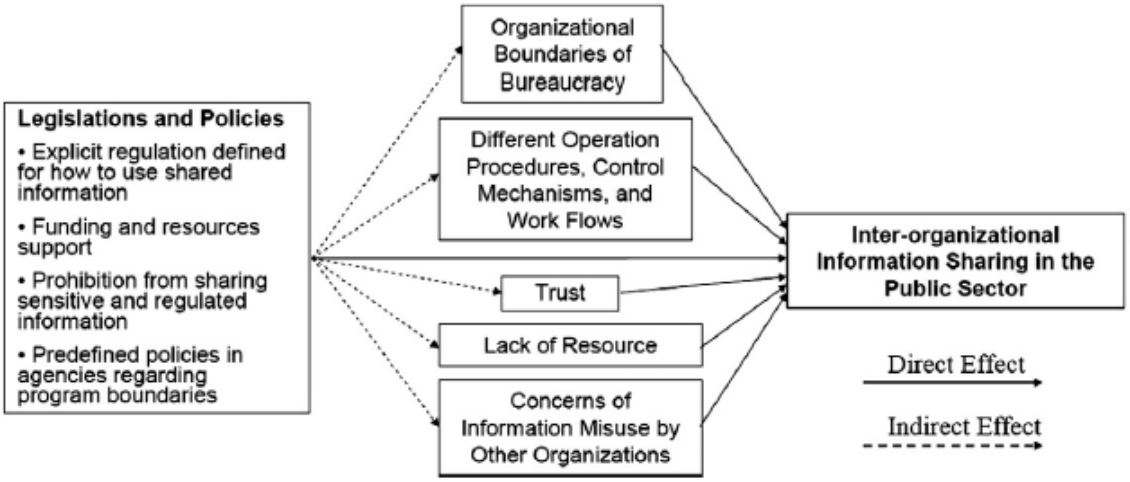
Figure 2: Factors Influencing Intra Organisational Information Sharing (Yang & Maxwell, 2011)



After a response to a major emergency multi-agency lesson learning and information sharing becomes of pivotal importance in improving future practice. Similarly information shared as part of the debriefing process to facilitate post event learning is an essential aspect of the planning process and successful recovery (Norman, 2003). Organisational debriefing should allow all responders irrespective of rank or status to share their experiences of an emergency, an exercise or other activity so that lessons can be identified and appropriate actions can be taken to adapt and modify procedures to improve practice (MCDEM, 2006). But information sharing is complex as can be seen in Figure 2, even when it is an accepted part of the debrief process it is apparent time and again that the dissemination of information does not facilitate organisational learning. Moreover Gosen and Washbush (1999) noted that the debriefing of exercises may well be a limitation to learning because of the way the Debrief can be conducted. Further to this, research carried out by Baker (2005) as part of an MSc by Research at Coventry University suggested that some organisations were quite reticent to share any problems/issues identified in their organisational debriefs arising from their response to events or during an exercise with others both internally and externally. Vashdi et al (2007) firmly link the debriefing process to single and double loop learning suggesting that most debriefing actions lead to single loop learning where *"actions are framed within existing shared*

mental models and are incorporated into existing norms, policies, and objectives." (p 118). They further suggest that the use of reflexivity during the debrief process would help organisations to develop double loop learning by challenging 'taken for granted' mental models that are entrenched within the organisational culture.

Figure 3: The relationship Factors that Influence Inter Organisational Information Sharing (Yang & Maxwell 2001)



Once lessons are identified internally, good practice generally dictates they are then shared with other responders in a multi-agency debrief. This again can present problems and according to the literature (Lagadec, 1997, Yang & Maxwell 2001) inter organisational sharing of information and knowledge relies heavily on trust relationships between the organisations. Dekker *et al* (2008) also explicitly mention trust as critical to the success of learning particularly where stories of failure are shared between organisations whilst Berlin and Carlström (2011) highlight the lack of incentives and motivation to share information at the risk of *"making a fool of oneself"* (p167). Figure 3 shows how organisational boundaries, different operating procedures, control mechanisms and work flows along with trust, resources and concerns about the misuse of information by other organisations all present barriers to the way information is shared and learning can be facilitated. Lagadec goes on to conclude that *"Learning processes are barely tolerable within an organization, and they become even more problematic across organizations."* (p29)

6 Why We Find it so Hard to Learn the Lessons of Experience

A study carried out in the US by Donahue and Tuohy (2006) into why we don't learn found that the repeated lessons in disaster response were;

- poor communications; the emphasis here was on the failure of technical infrastructure and the un-willingness of responders to agree the specification and to commit resources for shared systems. They also noted there was an un-willingness to share all information in a comprehensive way and put this down to lack of trust between responding agencies.

- un-coordinated leadership; unclear, multiple, conflicting, uncooperative and isolated command structures were cited as major problems. Command and control structures were diverse and little understood between agencies which resulted in struggles for scarce resources and again a lack of trust between agencies.
- weak planning; multi-agency commitment to plans that may be watered down to permit compromise. Plans developed by mid-level managers with no formal training for senior managers. Similarly plans are not disseminated to training academies or supervisors resulting in front line staff not knowing what to do on first arrival at the scene.
- resource constraints; in an age of austerity competition for key resources is difficult on a daily basis but in a major incident this gets much harder and resources become even more scarce and as a result exert extra pressure on agencies at a time when they are needed most.
- lack of training and exercises to embed lessons; plans were not trained or exercised fully as a result agencies did not work well together or understand each other's organisations and needs in an emergency.

Whilst the problems identified in the study are focused on the US and in particular on the response to 9/11 and Hurricane Katrina and not necessarily issues for the UK, some of the solutions proposed by the research are relevant to the UK and its response systems.

Donahue and Tuohy (2006) recognise that the issue is *how* to learn the lessons rather than what to learn. They note that quite often there is a lack of a formal, rigorous and systematic methodology for learning and that understanding how people learn and retain information is of major importance. They identify a lesson learning cycle of "Identify the lesson → recognise the cause → devise a new operating process → practice the new process → embed/institutionalise and sustain the new process" (p13). They suggest that problems arise when agencies consider the lessons in isolation rather than as systems or broad patterns of behaviour and that the real weakness in the system comes in the last two phases of the cycle because agencies don't have a deeper understanding of how to learn. Because really learning lessons may mean change that is hard to entrench at the front line, agencies that do embrace learning and practice new processes can be lulled into a false sense that they have dealt with the problems only to find that when the next big thing hits that the lesson has not been embedded as well as they thought it was. A point recognised by the Cullen Inquiry into the Piper Alpha disaster as long ago as 1988, *"Senior management were too easily satisfied that the* [Permit to Work] s*ystem was being operated correctly, relying on the absence of any problems as indicating that all was well* (Piper Alpha Inquiry, 1988)"

They further advocate that learning lessons generally means organisational change and that "enduring change needs to address the structure, system, and culture of an organisation so that patterns of behaviour can be adjusted" (p21). The big lessons, they say are multi-agency lessons and systems need to work at institutional level, across service boundaries and across multi-agency boundaries.

7 Individual Learning

"The ability to learn then is not based on mastery of vast amounts of recorded information, but on an openness and freshness of mind" (Van Brabant, 1997: 17).

Senge (1990) suggests that as individuals we need to adopt what he calls '*personal mastery'*, that is the ability to see clearly what is important and what is not, and to look at current reality alert and unburdened by models and interpretations of other situations. What Senge is implying here is that although two different events or situations may look similar and have the same consequences it must not be assumed that they have the same underlying cause. Each event should initially be approached as new and not as one that has been experienced before. He further suggests that learning involves better documentation, reflection and analysis for 'institutional memory', and the ability to 'suspend' our acquired knowledge and viewpoints, so as to look at each situation afresh, this then provides the space to recognise 'differences' and inquire into our assumptions helping to facilitate double loop learning.

Developing the theme of 'how to learn' Ford and Schmidt (2000) suggest that learning lessons presents some particular challenges for those involved in emergency management because of the uncertainties that responders in particular may face during an event. Anecdotal evidence suggests that at times the principles (or aims) of an effective response, shared situational awareness for instance, are sometimes confused with the standard procedures (or objectives), the way the aim is achieved, needed to provide that response. Major emergencies are unique events and one learning challenge that may present itself for responders is an understanding how basic principles can be achieved through different routes that are still valid but not necessarily documented in a step by step fashion. In other words (as discussed in section 8 below) thinking through problems to establish wider rules and generalisations to reach the same goals.

Ford and Schmidt (2000) further consider the importance of and the need to develop responder interpersonal and systems awareness competences as well as technical expertise for effective individual and team performance. The problem for emergency management they note is being able to transfer learning from training to real world situations because of the lack of retention of knowledge and skills over time and the limited opportunities to practice response skills during normal operations. Donahue and Tuohy (2006) also point out that response agencies need to have a deeper understanding of how to learn and that training programmes at service educational institutions should be teaching learning science and systems thinking to all who pass through their doors.

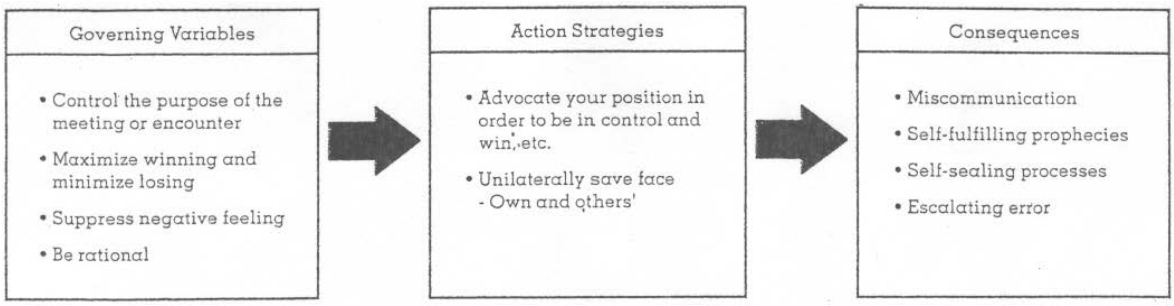
Ford and Schmidt (2000) highlight a number of ways for developing individual learning for a more effective response, these include;

- routine versus adaptive expertise: individuals who develop routine expertise are focused on successful performance and can be constrained by process and procedure whereas those that develop adaptive expertise have a deeper conceptual understanding, are able to recognise when novel solutions are needed and realise that the biggest gains in learning and continuous improvement requires connections with people and the efforts of many. Much

of this view is supported by Borodzicz (2004) who maintains that creativity and flexibility are paramount to good crisis management.

- challenging mental models: Argyris and Schön (1996) discuss *theories in use* or mental models (Models I & II) that have governing values[3] and dictate the way in which individuals conduct themselves. Model I (Figure 4) is "*learned at an early age, used without little conscious attention and by using defensive reasoning allows individuals to tacitly emphasise the positive in their actions and supress negative feelings, all of which are counterproductive to learning."*(p 11) Model I describes how individuals in defending their actions will strive to develop their positions, evaluations, and attributions in ways that inhibit or deflect inquiries into those actions or seeks to test them with the use of independent logic. Argyris and Schön (1996) suggest this leads to defensiveness and mistrust and can lead to the transmission of erroneous beliefs such as the case of the 1989 Hillsborough Football Stadium disaster where it was assumed that all Liverpool fans were drunken hooligans and therefore contributed to their own deaths and injuries. Ford and Schmidt (2000) contend that if learning is to be achieved then training needs to be designed that will challenge such a model and lead to the development of responders who can assimilate learning and whose skill set and knowledge is effectively designed for learning from rapidly changing uncertain conditions (Model II).

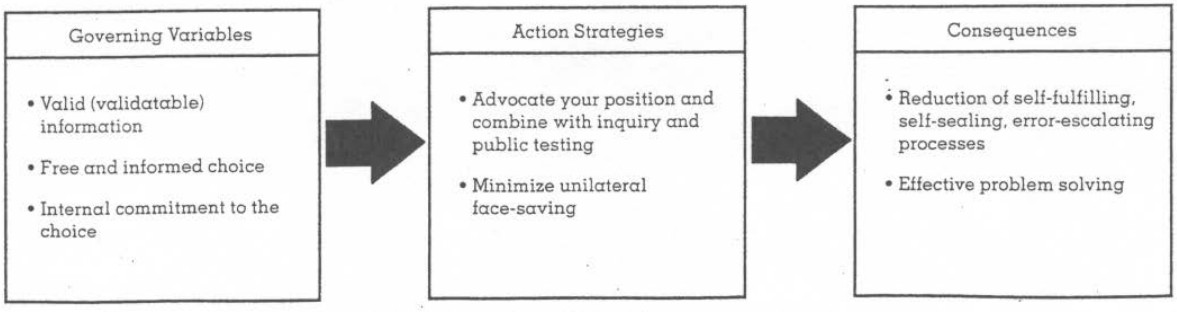
Figure 4: Model I, Theory in Use (Argyris and Schön, 1996)



- Unlike Model 1 behaviours Model II (Figure 5) behaviours are open and explicit and use productive reasoning to reach conclusions that are independent of the individuals own logic. Model II behaviours are essentially the same as the metacognitive skills (learning how to think, self-reflective skills, testing assumptions) discussed later in section 8. Behaviours demonstrated by individuals with Model II mental models lead to a reduction in the transmission of erroneous beliefs and more effective problem solving. Argyris and Schön (1996) further suggest that those individuals who exhibit Model II behaviours will *"begin to interrupt organizational defensive routines and create organizational learning processes and systems that encourage double-loop learning in ways that persist"* (p 12) The issue here perhaps is being able to train individuals to automatically access these skills in emergency situations and override the deeply embedded behaviours of Model I that we all process.

[3] Model I *"theory-in-use is composed of four governing variables: (a) be in unilateral control; (b) strive to win and not lose; (c) suppress negative feelings; and (d) act rationally"*: *"The governing values of Model II are valid information, informed choice, and vigilant monitoring of the implementation of the choice to detect and correct error*" (Argyris, 2002: 213 & 215)

Figure 5: Model II Theory in Use (Argyris and Schön, 1996)



- performance orientation versus mastery orientation: here two different goal orientations (Dweck 1986 cited in Ford and Schmidt 2000; 202) that people can take towards training are discussed with regard to how retention of new knowledge and skills can be achieved. Performance oriented individuals tend to think that ability is demonstrated by performing better than others whereas mastery orientated individuals focus on developing new skills, attempt to understand their tasks and believe success comes from challenging self-referenced standards. Consequently research has found that learning situations that emphasised performance goals lead trainees to focus on their lack of ability ('do better next time') and attribute failure to lack of ability whilst learning situations that emphasised mastery goals (acquisition of new skills, understanding and self-reflection) lead trainees to use complex learning strategies and were more likely to learn how to learn and as a result retain their learning in the longer term which may help with 'organisational forgetfulness'.

It is apparent from the sources cited in this section that understanding the way individuals learn is not new yet as Donahue and Tuohy (2006) point out emergency response training establishments in the US still appear to lack such understanding. Ford and Schmidt (2000) have highlighted the challenges faced by those whose design training and teach emergency responders and suggest ways in which those challenges can be overcome. Significantly however there is no research available that focuses in such depth on emergency response training in the UK, a situation that perhaps needs to be addressed if we are to be able to learn our lessons and enhance our performances.

8 Improving Team Performance & Team Cognition in Multi-Agency Emergency Response

There is a debate amongst organisational psychologists regarding what constitutes team knowledge and therefore team cognition. Wildman *et al* (2011) state that there are two approaches to conceptualising team cognition, firstly the team knowledge approach which suggests that emergent knowledge structures (shared mental models) are developed as a result of team interactions and secondly, the process approach which suggests that team actions and behaviours are external and firmly rooted in individual level cognitive processing. Basically, taking a systems perspective, if new knowledge is the emergent property of a team is it greater than the sum of its parts? On the other hand is team knowledge simply the cumulative property of individual knowledge? On the face of it these questions may seem to be fairly abstract considerations for learning lessons in emergency response but they could become significant when applied to the composition of ad hoc multi-agency teams that are created in response to a major emergency. As Wildman *et al* (2011) point out understanding dynamic team knowledge and how it affects performance becomes important when considering high risk areas like those in strategic, tactical or operational command and control

teams. This may be particularly true for multi-agency teams where the team's ability to adapt, perform and respond effectively in highly complex, high velocity environments depends upon well developed mental models and shared situational awareness that are focused on changes over time (*ibid*: 104)

The earlier work of Ford and Schmidt (2000) supports this view of performance in emergency response teams and suggest that rather than task focused skills it is teamwork skills[4] that are crucial to good performance, a notion reinforced by Salas et al (2002). Harrald & Jefferson (2007) also note that difficulties arise for multi-agency teams where "*decision makers are operating on a level playing field,* (within their own services) *with shared backgrounds, organizational culture, goals, and training"* (p 6) move to an environment where they have very diverse backgrounds, training, goals and so on. Training solutions proposed by Ford and Schmidt (2000) to overcome the challenges and develop better performance in multi-agency teams include;

- enhancing active learning in training situations; asking the 'what if' questions and allowing for complex real life problems to be understood and solved in formal training sessions by constructing simplified versions of the problem. Simulations are one way of achieving this (Borodzicz, 2004).
- enhancing generalisation through an inductive (i.e. working 'up' from specific observations to establish wider rules and generalisations) rather than a deductive (i.e. working 'down' from general statements to reach specific conclusions) approach; allowing trainees to explore a task or situation and to infer and learn what is needed for effective performance. In this way more in depth learning is achieved and adaptive expertise is promoted.
- include more error based learning activities; research (Baldwin, 1992 cited in Ford & Schmidt 2000; 206) has found that trainees presented with both the correct and incorrect models of a task or situation have demonstrated more learning that those presented with only the correct way to do things. Again this is a methodology supported by Borodzicz (2004).
- develop metacognitive skills (i.e. an awareness and understanding of how you think, sometimes referred to as 'thinking about thinking'); develop learners capability to regulate their own learning through planning, monitoring and evaluation. Again research (Ford et al, 1998) has shown that learners who developed a metacognitive ability learned more and were better able to transfer the learning to more complex tasks.
- develop shared mental models; here Ford and Schmidt (2000) suggest that overcoming the challenge of multi-agency teams can be helped by 'cross training'. Allowing team members to learn the roles of other team members thus facilitating the development of interpositional knowledge which in turn will lead to implicit coordination and greater team adaptability (p 210).
- Develop team leaders; they further suggest that developing team leaders as facilitators of continuous learning can also enhance team performance. However this assumes that the same people will remain members of the team throughout its development. Others have pointed out that one of the major problems with multi-agency teams in the UK is the lack of continuity in command and control teams as people change roles and move on to different tasks.

[4] *(a) adaptability, (b) situational awareness, (c) performance monitoring, (d) interpersonal skills, (e) coordination skills, (f) communication skills, (g) assertiveness, and (h) decision making skills.* (Ford and Schmidt, 2000: 208)

While there are valuable pointers towards better practice here, some of the literature cited here is quite old and has a US focus which again highlights the lack of research undertaken in the UK with regard to 'how to learn' lessons from emergencies and how to retain the learning once it has been acquired.

9 Culture and Organisational Learning and Change

Most commentators cited in this paper agree that the fundamental issues with regard to inhibiting the learning of lessons are those of an entrenched organisational culture that is blind to the deeper level causes of failure and a too-often weak commitment to change at all levels of the organisation. Eminent amongst the scholars of organisational culture and learning are Argyris, Senge and Schein each of whom firmly link an organisations ability to learn to its culture. Schein (1996) in particular describes the three cultures[5] of an organisation and suggests that in order for the organisation to learn effectively and move forward each of the cultures must be aligned. In bureaucratic hierarchical organisations such as emergency services this can become even more of a problem because there may be a significant disconnect between the higher and lower ends of the service. Equally the problem is heightened even more when a multi-agency team is put together to manage an emergency as noted by Harrald & Jefferson (2007) previously.

Another aspect of organisations that is identified in the change management literature is the existence of what the theorists call '*deep structures'* (Gresick, 1991). These relate to organisational culture as seen in the entrenched norms, values, beliefs, structures and routines of organisations. They are particularly important where organisations are in a state of equilibrium; that is not responding to disturbances in their systems and conducting 'business as usual', because they create a notional stability within the organisation that is unreceptive to change. For the emergency services this could be the period between responses to major emergencies when an underlying state of equilibrium exists and the need to challenge and test assumptions is seen as disruptive and unnecessary.

Donahue and Tuohy (2006) firmly emphasise the need for a learning and adaptive culture and a commitment to change within emergency response organisations. They suggest that culture change occurs when assumptions are challenged and errors are developed in the organisations collective memory especially when other organisations threaten the legitimacy of beliefs and values about what is appropriate and expected. Change in response to lessons identified from major emergencies, they say, is difficult and hard for response organisations because they are rare events and thus do not give agencies a reason to challenge their operating assumptions. This becomes particularly problematic when organisations are requested to consider new processes that have been identified from the experiences of others and not their own. Finally they posit that the emergence of improved practice may be slowed or even obstructed by the absence of an explicit strategy on the part of response organisations to learn and change.

[5] *Learning problems can be directly related to the lack of alignment among three cultures……. (1) the culture of engineering, (2) the culture of CEOs and (3) the culture of operators – and the shared assumptions that arise in 'line units' of a given organisation as it attempts to operate efficiently and safely*. (Schein, 1996: 13)

10 Conclusions and Recommendations

It is clear from the literature surveyed that there is a myriad of reasons why we don't learn the lessons from emergencies that are routinely identified. Prominent amongst these are the apparent failure to translate policy level learning to operational practice; the loss of organisational memory that comes with incremental development and a flexible workforce; the inability of organisations to distinguish the difference between single loop and double loop learning; the management of information both within organisations and between organisations which inhibits the dissemination of learning from emergencies; a constant focus in training and education on what to learn rather than how to learn; organisational cultures and deep structures that create an underlying equilibrium in organisations that can be immune to perturbations in the system and thus prevent learning; a reluctance to commit to change management programmes to embed learning particularly when the learning comes from an external source.

Although much of the research evaluated in this paper is relevant and generalisable and as mentioned in the introduction, it does in the main come from and has a US focus which only serves to demonstrate the lack of any real empirical research that emphasises a UK perspective. Consequently the first long term recommendation is for more funded research to develop a body of knowledge other than doctrine that can provide the evidence base for the translation of learning and improved practice from strategic to operational level. Once an evidence base has been established more attention to learning lessons must be included in the doctrine that guides the way we deal with emergencies.

Secondly, the emergency services need to examine the way in which they manage, use and share information both internally and externally. Provision should be made for the capture of and retention of organisational memory and the management of knowledge within systems that are interoperable. If there is a real commitment to learn lessons and as a result fundamentally change organisational behaviour then an in depth analysis of information sharing needs to be carried out and organisational assumptions regarding dissemination of knowledge and information tested to the limit.

Thirdly, as several commentators have pointed out emergency response organisations present some particular challenges for learning lessons from emergencies. It is clear from the literature that we need to concentrate on how to learn if we are to be successful. In this regard an evaluation of current training practices and a better understanding of how learning sciences can improve retention and develop metacognitive and team skills that will enable members of ad hoc multi-agency teams to interact in an effective way are perhaps vitally important.

Fourthly, and perhaps the most difficult to deal with are the issues of understanding how organisational culture can inhibit learning and how a deep level commitment to change that is transitional rather than incremental and developmental can be achieved. The emergency services perhaps need to look inside themselves, understand where they and others sit within their operating environment, be able to test their 'taken for granted' assumptions and then adopt an explicit strategy to learn and change.

Finally, there appears to be a need to promote a greater awareness of the problems associated with not converting 'lessons identified' into 'lessons learned'. This review has highlighted some issues

that will need long term solutions but in an effort to 'start the ball rolling' in the short term the following recommendations are offered;

- Nationally an explicit and easily accessible policy on identifying and learning lessons should be drawn up and published.
- More attention should be drawn to the issue by adding a new chapter (with case studies of good practice) on the process of identifying and embedding lessons to the various non-statutory guidance publications that are used by responding organisations.
- An audit process that is efficient and transparent should be developed to ensure that lessons identified, particularly from public inquiries or Rule 43 Coroner's reports are acted upon in a timely manner.
- A training course could be developed by the Emergency Planning College on how to identify and learn lessons arising from exercises and major emergencies which would help raise awareness of the issues.
- An ongoing process of 'cross training' should be considered for all levels of command and control in emergency response so that multi agency teams fully develop a wide ranging understanding and appreciation of how their response partners think and operate under uncertain conditions.
- An introduction to major emergency response and the role played by those who are first on the scene should be included in the induction training of new emergency services officers again to raise awareness of the issues.

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