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N8 Policing Research Partnership

Critical Incident Decision Making: Evidence Review

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Background

The critical incident environment is uncertain, complex and time pressured. Efficient decision making is essential for facilitating action. This review will: describe the decision making process; identify barriers to decision making; review the interventions currently used to facilitate decision making; and provide recommendations for interventions to improve critical incident decision making. For the purposes of this report the terms 'critical incident' and 'major incident' will be used interchangeably to reflect any high-stakes emergency incident.

Key findings

- The critical incident environment is complex and ambiguous.
- Uncertainty can derail decision making, leading to failures to act through decision avoidance and/or decision inertia.
- This report highlighted three areas specific to critical incident decision making where improvements are required:
 - Communication;
 - Trust and Relationships;
 - Strategic Coordination.
- We suggest two areas of research where advances could reduce uncertainty and facilitate critical incident decision making:
 - Technology;
 - Joint training.
- Collaborative research between academics and practitioners is the best way to trial these interventions.
- The impact of interventions on critical incident decision making can be tested and validated through a variety of methods including, but not limited to, cognitive interviews, immersive simulations and live exercises.

1. Decision Making at Critical and Major Incidents

The 7/7 London bombings, the riots of summer 2011 and the mass flooding of areas in the UK in the winter of 2013/14 are recent UK major incidents. These incidents are uncertain, unstable and unpredictable ([Alison & Crego, 2008](#)) and place huge pressures on decision makers tasked with commanding at operational, tactical and strategic levels. Category one (i.e. emergency services, local authorities) and category two (i.e. utilities, health & safety; transport) responders are duty bound by the Civil Contingencies Act ([2004](#)) to preserve life, reduce harm and restore normality during such emergencies. Responders must have the expertise required to rapidly recognise and/or assess the situation whilst matching and/or generating appropriate plans of action ([Klein, 1989](#)). Importantly, they must be able to make a decision by committing to a selected course of action in order to achieve their desired goal ([Hastie, 2001; Yates, 2003](#)).

The decision making process has three phases: 'situation assessment'; 'plan formulation'; and 'plan execution'. It is an iterative process that is guided by 'team learning' ([van den Heuvel, et al., 2012](#)). Decision makers tend to process information by using both intuitive and analytic cognitions ([Allen, 2011; Mishra, et al., 2013](#)). The dual-process model describes how decision makers shift between system 1 (intuitive, unconscious) and system 2 (analytic, thoughtful) thinking when faced with a task ([Kahneman & Frederick, 2002](#)). The more experienced a decision maker is in the decision domain, the more likely they are to use intuitive 'recognition primed' pattern matching to rapidly instigate action ([Klein, 1989](#)) or are able to short-cut choice by making accurate 'leaps' during the decision making process ([Jenkins et al., 2010](#)).

2. Barriers to Decision Making

Critical incident decision makers sometimes fail to reach a decision at all ([van den Heuvel, et al., 2012](#)) as they avoid choice by seeking to ignore it ([Anderson, 2003](#)), or they redundantly deliberate and fail to commit to action through *decision inertia* ([Power & Alison, 2014](#)). Uncertainty blocks or delays action due to an associated sense of doubt ([Lipshitz & Strauss, 1997](#)). The causes of uncertainty can be dichotomised as either resulting from endogenous sources (i.e. elements specific to the critical incident environment being dealt with at the time) or exogenous sources (i.e. uncertainty related to the elements and structure of the 'operating system' responding to the incident; [Alison et al., 2014](#)). This report will focus on the latter as they are most amenable to interventions.

2.1 Communication

Following the Derrick Bird shootings in Cumbria on 2nd June 2010, an independent review by the Assistant Chief Constable Simon Chesterman criticised the decision making of the police and ambulance service for failing to cooperate effectively. Failures in communicating different standards of 'risk' derailed decision making and induced inaction. Poor communication in multi-team systems is a key barrier to the decision making process ([Chen et al., 2008](#)). Communication establishes 'macrocognition' - the shared internal and external knowledge within the team that assists problem solving ([Fiore et al., 2010](#)). Macrocognitive mental models are important during early situation assessments as they reduce uncertainty and risk in the team network ([Schubert et al., 2012](#)). Communication must occur between and within agencies and there must be shared meaning to these communications ([Keyton & Beck, 2010](#)) with avoidance of agency-specific acronyms ([Mishra et al., 2011](#)).

2.2 Trust and interpersonal relationships

When an individual trusts another they are willing to take risks and be vulnerable to the consequences of actions taken ([Mayer et al., 1995](#)). Although trust is seen as an emotional process, cognitive trust (i.e. trust in another's ability) is more important for action facilitation ([Parayitam & Dooley, 2008](#)). Trust is established between individuals (and teams) through reciprocal and reliable information exchange ([Rusman et al., 2010](#)). When trust is absent, this derails decision making as agencies focus on intra- as opposed to inter-agency decision making goals ([Alison et al., 2014](#)). Individuals are less likely to take action if they anticipate potential negative emotions associated with regret following poor decision outcomes ([Anderson, 2003](#)). This reluctance is exacerbated when decision makers expect feedback and blame for their actions when being held to account ([Waring et al., 2013](#)). Interestingly, although individuals place less stock in the advice that they receive from distrusted sources, trust breakdowns can be repaired through good information sharing ([Ibrahim & Allen, 2011](#)). This paradoxical relationship provides an interesting avenue for further research.

2.3 Strategic goals and command structure

The hierarchical command structure currently used in the UK is based upon reciprocal information sharing at strategic, tactical and operational levels. Strategic ‘superordinate goals’ assist those down the command chain to generate and evaluate potential courses of action ([Cannon-Bowers et al., 1995](#)) that require coordinated efforts between agencies to be attained ([Sherif, 1962](#)). Strategic direction facilitates inter-agency discussions specifically on action execution ([Alison et al., 2014](#)) as common goals transpose individual agencies into a powerful collective to facilitate action ([Katzenbach & Smith, 1993](#)). ‘Action theory’ describes how emergency responder behaviour is orientated by goal-directed behaviour as a product of socially-derived knowledge ([Allen, 2011](#)). Yet when common goals are lacking then decision making is more difficult ([Wittenbaum et al., 2004](#)) as inter-agency activities are no longer synchronised ([Tesluk et al., 1997](#)). When uncertainty infiltrates the command structure then this can have widespread implications on the effectiveness of communication and information exchange, the understanding and trust on roles and responsibilities and fundamentally derail action ([Alison et al., 2014](#)).

2.4 N8 Workshop – ‘After the floods’

A recent N8 workshop reviewing the recent response to flooding in the UK was conducted to discuss the key issues that affected decision making. A key area of decision making that was identified was the ability to communicate information effectively. Poor information sharing impedes effective decision making in three ways: (i) when information is *missing*; (ii) when information is *misunderstood*; and (iii) when there is *too much* information. Information exchange may be improved by: (i) gathering of information; (ii) presentation of information; (iii) cognitive processing of information; and (iv) enabling factors that turn information into action.

3. Conclusion: Recommendations to Improve Critical Incident Decision Making

Critical incident decision making may be improved by conducting targeted research into two areas: technology and joint training. Research can be used to trial, test and gather feedback on the usefulness of interventions. Possible methods for conducting research include live exercise observation ([Salmon et al., 2011](#)), the use of immersive simulated learning environments ([Alison et al., 2013](#)) and gathering feedback through questionnaires and cognitive interviewing ([Hoffman et al., 2008](#)). Table 1 outlines how research and training can explicitly improve critical incident decision making with regards to communication, trust and strategic direction.

3.1 Technology

Technology remains a relatively untapped resource for advancing critical incident response. A pilot project at the University of Liverpool explored how autonomous aviation technologies could be used to gather and distribute shared visual models between different agencies ([Power et al., 2013](#)). Agencies could also make better use of the data already available in society such as social media (e.g. twitter) ([Wright, 2014](#)). Technology can enhance the UK’s resilience to modern threats through investigative technology. For example, on 31st March 2014 CERT-UK was launched; a national Computer Emergency Response Team who will prevent, monitor and respond to threats relating to cyber security. It is important that technology is designed in a manner that supports rather than hinders decision making. Technology can add complexity to the decision making environment and reduce information sharing ([Mishra et al., 2011](#)). There has been relatively little exploration of how decision support systems can specifically facilitate intuitive processing ([Mishra et al., 2013](#)). From a multi-agency perspective, there is the added problem of inconsistent and unshared technology; if one agency does not have access to the technology (e.g. airwaves) then information sharing is at risk of collapse throughout the multi-agency network ([Mishra et al., 2011](#)). Work in Europe is currently exploring how technology can facilitate communication and understanding when emergencies arise at cross-border locations ([Markarian, 2014](#)); this structure could be applied to cross-agency communications.

3.2 Joint training

There is also a great deal of potential to improve critical incident decision making through training. The UK government’s ‘JESIP’ (Joint Emergency Services Interoperability Programme) initiative defines ‘interoperability’ as “*the extent to which organisations can work together coherently as a matter of routine*” (p.2). JESIP outlines how a multiagency response can be improved by following various joint principles and aims to achieve this through joint training and the uptake of shared decision making frameworks. Joint training facilitates the exchange of

meaningful and relevant information between agencies as they gain a greater understanding of one another's roles and priorities ([Chen et al., 2008](#); [Marks et al., 2001](#)) and a decentralised or 'network-centric' approach to decision making. ([Boersma & Wolberg, 2014](#)). A recent review on the state of 'interoperability' in UK emergency response recommended that a decentralised command structure was more useful to decision making and that the current hierarchical structure (i.e. operational, tactical, strategic) should be revised ([House et al., 2013](#)). Although centralised interoperability may be useful for long-term strategic planning, decision making on the incident ground may be better served by decentralised structures that rely upon agency-specific expertise and tasking ([Allen et al., 2013](#)).

Table 1: How research and training can facilitate improvements in communications, trust and the setting of strategic goals

Area of focus	Why is it important?	How might it be improved?	Research and training to improve decision making	
			Technology	Joint Training
Communication	To enhance shared understanding and facilitate timely decision making	Multiagency communications would improve if they were more frequent and meaningful	Communication can be facilitated by developing technologies such as a shared digital map that depicts a graphical visualisation of the incident ground and can be updated in real time to communicate dynamic changes during the incident	Communication can be facilitated by joint training as commanders become more familiar with 'other' agency-specific terminology
Trust	To increase the willingness of team members to be vulnerable and take risks (i.e. make decisions) based on information received from others	An increase in cognitive trust (i.e. abilities) is most useful for action. This could be achieved by enhancing the understanding of roles and responsibilities.	Trust can be facilitated by developing technologies such as a digital tool that stores the key roles and responsibilities of all agencies that can be rapidly accessed	Trust can be facilitated by joint training as decision makers are able to establish inter-personal relationships with one another
Strategic Direction	To facilitate tactical planning by reducing confusion and providing a common goal	Strategic goals should be made central and explicit at all multiagency meetings	The clarity of strategic direction can be facilitated by developing decision support tool that clearly states current strategic goals that must be electronically checked and acknowledged during tactical planning	The clarity of strategic direction can be facilitated by joint training as recurring superordinate goals can be identified during training and then rapidly highlighted during real incidents

Further Information

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