



Incident command training: the introspect model

Incident
command
training

Katherine Jane Lamb, Jim Davies and Richard Bowley
*Incident Command Development, Oxfordshire Fire & Rescue Service,
Oxford, UK, and*

John-Paul Williams
Oxfordshire Fire & Rescue Service, Oxford, UK

131

Received 16 September 2013

Revised 4 March 2014

Accepted 6 March 2014

Abstract

Purpose – The purpose of this paper is to present the use of simulation in both the development and assessment of Fire & Rescue Service incident commanders. Continuous development and assessment is required due to a reduction in incident numbers causing skill fade.

Design/methodology/approach – This paper details the development and implementation of the “Introspect model” of assessment by Oxfordshire Fire & Rescue Service (OFRS) over a five-year time-span, and discusses its key findings in line with current decision-making ideologies and principles.

Findings – The “Introspect model” provides a unique assessment and development tool, which adheres to current national guidelines. It is also an accredited component of incident commander development within OFRS. The authors propose that this model becomes “best practice” for other Fire and Rescue Services.

Practical implications – The national use of the “Introspect model” will ensure that all incident commanders benefit from understanding the rationale behind their decisions, striving towards a universal state of unconscious competence within incident command nationally on the fire-ground.

Originality/value – The originality/value of this paper lies in an in-depth analysis of simulation-based software for the development and assessment of incident commanders. This paper is the first to suggest a model of “best practice” regarding the assessment and development of Fire and Rescue Service incident commanders.

Keywords Decision making, Decision inertia, Fire service, Incident command, Introspect model, Oxfordshire fire & rescue service

Paper type Case study

Article

Over the last decade the number of national operational incidents responded to by the Fire and Rescue Service has diminished by approximately 40 per cent (Knight, 2013) and by an additional 4 per cent in the last 12 months alone (Department of Communities and Local Government, 2013, Fire Statistics Monitor: England April 2012-March 2013). This reduction of incidents has a direct correlation with the diminished exposure of incident commanders and firefighters to the experiential learning opportunities found at operational incidents. The direct outcome of this reduction in incident numbers and consequently diminished evaluation skills of the incident commander has arguably resulted in preventable fatalities (Penton *et al.*, 2013), or the loss of saveable property through the application of unnecessary defensive firefighting tactics. These two opposing extremities of the risk assessment process are evident in individuals with deteriorating evaluation skills, exacerbated as a result of skill fade, due to diminished incident exposure. This paper will review the current use of simulation during incident command training, and more specifically detail the development, application and review of the “Introspect model” used in Oxfordshire Fire & Rescue Service (OFRS), in an attempt to readdress this incident evaluation imbalance.



International Journal of Emergency
Services

Vol. 3 No. 2, 2014

pp. 131-143

© Emerald Group Publishing Limited

2047-0894

DOI 10.1108/IJES-09-2013-0023

The OFRS incident command team strive to achieve the following mantra with all incident commanders throughout our service.

“The right person, making the right decisions at the right time, for the right reasons”.

Attainment of this status is the “utopian” safe person concept, acknowledged as unachievable, but by constantly striving towards this goal we ensure we have the safest person available at any given time. The safe person concept is an ideology used by the Fire and Rescue Services to manage the risk to personnel at operational incidents. Operational incidents are inherently dangerous places so in these environments where it is impossible to make the workplace safer, fire-fighters and incident commanders are trained to be safe within a dangerous environment. There are two aspects to this approach – organisational responsibility and personal responsibility. The organisation is obligated by Health and Safety law to provide appropriate support (training, equipment and procedures) to ensure that all personnel are able to remain safe in a hostile environment. The individual has a personal responsibility to utilise these procedures and systems provided by the organisation in order to keep themselves and others safe. In addition, the incident commander needs to make professional judgements about the appropriate use of available resources and to correctly manage the risks during an emergency situation (Home Office, 1998).

The “right person” is identified through a series of selection tests covering aptitude, knowledge and practical ability, according to frameworks and role-maps as stipulated by National Joint Council for Local Authorities Fire and Rescue Services (2009). However, the “right” decisions, “right” time and the “right” reasons are much harder to define and measure.

The role of the Fire and Rescue Service is extremely diverse; with the number of different incident types currently standing at 131. These incidents require an “All Hazard” incident commander to have the capacity to make the right dynamic decisions, at incidents as varied as a plane crash or a water rescue, and ideally understand the rationale of those decisions. As a result of this huge variety it is impossible to apply a formulaic process to conclude each incident. Instead the incident commander needs to evaluate the situation, and apply a risk-based strategy and initiate an appropriate bespoke plan to resolve the incident.

It has been well documented that incident commanders use the Recognition-Primed Decision (RPD) model to make dynamic decisions on the fire-ground (Klein, 1989, 1998). This type of decision making has also been described as macrocognitive. Macrocognitive decisions are often complex, involve data overload, risk or high stakes. They are also made under extreme pressures with ill-defined or conflicting goals and involve conditions where few things can be controlled or manipulated (Klein *et al.*, 2003). These macrocognitive situations are commonplace during the time-critical decision making associated with operational incidents.

When incident commanders need to make a decision they quickly match the situation to the patterns they have learned, whether from previous incidents, training or procedures. If they find a clear match, then they continue to carry out the most typical course of action or follow a clearly defined procedure. However, there is more to RPD than just pattern matching. Recent studies by Klein, 2008 found that incident commanders evaluate a course of action by using mental simulation to imagine how their decision would pan out within the current context or situation, constantly reviewing the plan until they found the most appropriate option. Therefore the RPD model is a blend of intuition and analysis. The pattern matching is the intuitive part,

and the mental simulation is the conscious, deliberate and analytical part. A purely intuitive strategy relying on pattern matching alone would be too risky because sometimes the pattern matching generates flawed options. A completely deliberative and analytical strategy would be too slow; fires would be out of control by the time the commanders had finished deliberating (Klein, 2008). But how do we train to develop these competencies in lieu of operational incidents, further how do we assess their attainment and subsequently maintain them?

In recent years, command training across the UK Fire and Rescue Service has been developed and a number of different command courses have been written by each of the Fire and Rescue Services, specifically for use by their own Service. However, the depth and detail of these courses varies greatly between Services and many focus more commonly on the specialist field (e.g. Crew Manager courses) rather than the specific area of incident command at that level. Since 2007 Skills for Justice (recently rebadged as Skills for Fire and Rescue) have worked with the Chief Fire Officers Association to develop four distinct levels of command, which have recently been approved by OFQUAL (The Office of Qualifications and Examination Regulation), and subsequently into four command qualifications (Chief Fire Officers Association, Command Qualifications and Combined Training in the Fire and Rescue Service, 2013).

These levels are supported by Skills for Fire and Rescue (the four levels correspond to the Qualification and Credit Framework). These are detailed below:

- (1) Level 1 Award in Initial Incident Command (QCF Level 3) in Fire and Rescue Services. This level is typified by the officer who will demonstrate the ability to command and control operations at a task-focused supervisory level or to control a more serious escalating incident in the early stages until relieved of command by a supervisory officer.
- (2) Level 2 Award in Intermediate Incident Command (QCF Level 4) in Fire and Rescue Services. This level is typified by a responding tactical commander who will demonstrate the ability to review and determine incident status, assume responsibility and take over command and control operations at middle manager level.
- (3) Level 3 Award in Advanced Incident Command (QCF Level 6) in Fire and Rescue Services. This level requires an officer to tactically command the largest and most serious incidents, usually on scene or at an appropriate location, characterised by the requirement for tactical coordination and of having reached the stage of utilising developed command support.
- (4) Level 4 Award in Strategic Incident Command (QCF Level 7) in Fire and Rescue Services which covers the role of Strategic command associated with commanding within a Strategic Coordinating Group.

These newly recognised levels of command will provide an opportunity to focus on command itself. In OFRS we have recently been awarded direct claim status for our Crew Managers Development Course in which the NVQ Level 3 for incident command is embedded, and therefore meets the criteria for the Level 1 award detailed above (Skills for Justice Awards News, 2013).

However, there is a difference between being qualified to command and being competent to command. In addition, once an individual has passed a command assessment and gained the qualification they will still need to continually apply their learning and maintain competence.

Development of the introspect model

Following the attendance of OFRS at a cross-border incident in 2006, where a fire-fighter suffered life changing injuries, significant changes were introduced to improve understanding and application of the national incident command system. At the same time a process was introduced to assess and monitor the competence of all incident commanders within the service. The newly-formed Incident Command Development (ICD) team in OFRS developed a unique assessment and development system which we have recently named the "Introspect Model".

Previously, OFRS incident command assessments had loosely focused on the competencies found in the specific role-maps and were marked subjectively by the ICD trainers. The assessments were also optional, leading to only the individuals who perceived themselves as competent volunteering themselves for assessment. The new assessment system was created with the intention of assessing competence at all four levels of command throughout the organisation and most importantly to be compulsory.

In August 2005, the roles of Fire and Rescue Service employees were mapped nationally within the Integrated Personal Development Plan (IPDS), and these roles were assigned accredited occupational standards. These role-maps provide the framework for each specific role, and contain National Occupational Standards (NOS), which are the specific elements that underpin each role. Fundamentally, these role maps define the competencies required for each role, and all the roles within the Fire and Rescue Service were aligned with a role-map from firefighter to area manager.

Within the "Introspect model" it was decided to align any competency based Incident Command assessment within OFRS, specifically to the candidate's role-map. The order of the statements was altered to reflect the sequence of the decision-making model (DMM). The sequence involved in making dynamic decisions has been studied and documented by many academics. OFRS use an adaptation of the DMM published by the Department of Communities and Local Government, in the Incident Command Manual. It was felt important to demonstrate to the competent delegates that they were subconsciously following the DMM naturally throughout their command at an incident. Conversely, those candidates who struggled to demonstrate command competence could then align their own decision-making process with a naturalistic model, and hopefully recognise the areas where they fell short. With this in mind the statements from the respective role-maps were aligned with the phases of the DMM, and the specific elements of the NOS used as the measure statements for a minimum standard of competence. In addition, each of these specific NOS statements were altered in their wording to generate five statements within each of the assessment elements to generate a graded standard of competence.

Competence framework

Before the assessment process was implemented, a framework of organisational policy and procedures was produced. The policy identified that OFRS was adopting national guidance and it recognised the Incident Command System (ICS) as the nationwide safe and effective system for managing operations. Procedural documents were produced to facilitate the implementation of this policy and all aspects associated with the ICS. These procedures ensure the outcomes of the assessments hold a level of credibility within the organisation. The procedures also documented the three graded outcomes achievable using a traffic light system; a green result deemed an individual competent, requiring no additional support on

the incident ground. An amber result provides the individual with an additional level of support, via an increase in their incident command assessment frequency, monitoring on the incident ground and developmental assistance. If an individual is deemed not competent then a red result is issued. Without this infrastructure the assessment process has no credibility within the organisation and the individuals can't identify with its importance, and crucially will not support their own development and that of others.

Simulation-based training

As fire service incidents are dynamic and their timings unpredictable, it is very difficult to assess the candidates naturalistic decision making (NDM) within their natural sphere of work (Alison and Crego, 2008). Also it has been argued by many natural decision making theorists that the decision-making process should only be examined *in vivo* using field studies (Dunbar and Blanchette, 2001) because *in vitro* or simulated studies do not generate the fidelity required to study complex and realistic tasks. In addition, Orasanu and Connolly (1993) concluded that real-world decision events are characterised by time pressure, uncertainty, high stakes, conflicting goals and organisational constraints, elements not easily replicated in simulation.

Individuals who are experienced at NDM have been found to outperform novices because of their superior technical knowledge, ability to construct accurate mental models of the incident and to use efficient and effective information processing and decision strategies (Glaser and Chi, 1988; Klein and Hoffman, 1993; Lipshitz and Shaul, 1997; Murphy and Wright, 1984; Reimann and Chi, 1989). These experienced decision makers are constantly reviewing and updating their domain specific knowledge and decision making strategies, through processes of exposure/experience and self-review. By utilising these experienced decision makers in designing and implementing assessment scenarios, the appropriate cognitive and emotional responses are maintained (Crandall *et al.*, 2006). These experts provide the details of the problem landscape (Zimmerman *et al.*, 2011) that are essential for developing an overview of the chronological and connected decision-making phases of an operational incident (information gathering, evaluating, planning, communicating and review).

Expert involvement in design and implementation is important in creating simulations that are credible to the candidate, so that they take them seriously and engage with the process as they would in an operational setting (Klein and Woods, 1993). It is also essential to ensure that the psychological impact of time pressure, uncertainty and tensions are appropriate to the incident (Caird, 1996; Kozlowski and DeShon, 2004; van den Heuvel *et al.*, 2012).

Through the use of such experts, the ICD team in OFRS recreate the appropriate level of disorder, complexity and importantly dilemma within a simulated environment. To be realistic and immersive, simulations must be designed so that they mirror the reality of command. This means that the simulated event is one that the candidate might reasonably expect to be confronted with in the course of their normal work and is in-line with their roles and responsibilities. In OFRS, regional mobilisation guidance is used. Which suggests (as a guide) that Level 1 commanders should be able to resolve an incident which requires no more than 1-4 appliances, Level 2 commanders 3-7 appliances, Level 3 commanders 6-8 appliances, and Level 4 commanders 8 or more appliances.

To create immersion and to ensure credibility, the incidents need to be achievable and manageable given a candidate's current level of command skill, expertise, and

importantly appropriate to their role. If a candidate is managing a simulated incident well, then that incident should be well ordered and calm, and importantly the candidate should see themselves as in command. Conversely, if the candidate fails to take control and to resolve the unfolding incident, then problems are compounded and the situation worsens. For example, if the candidate is making appropriate command and tactical decisions then the fire will get smaller, and the crew on the fire ground will be well managed and clearly understand the plan to resolve the incident. However, if the candidate is struggling to resolve the incident as a result of poor command decisions or inaction then the fire will worsen and the scenario become more complicated. The correlation is clearly evident that the same skills are needed to resolve both simulated and actual incidents. These skills include good communication, effective use of resources and information, and a clear command strategy and are essential if the many problems arising from such incidents are to be identified, prioritised and resolved.

In 1996 Jonathon Crego designed The Hydra Immersive Simulation system as a unique high-fidelity development tool “that enables the monitoring of real-time leadership and decision-making in critical incidents” (Eyre *et al.*, 2008a, b), but based on the central ethos of safe learning. Hydra simulations use computerised scenarios, that replicate, multidisciplinary events which illustrate the complexity, uncertainty, time pressure and levels of stress that are characteristic of real-life critical incidents (Crego and Harris, 2002). Hydra immersive learning has assisted in developing the decision making of fire officers, police officers, social care professionals, the military and the private sector, in the UK and internationally (Alison *et al.*, 2012).

OFRS use the Hydra system as a tool to deliver incident command training to all incident commanders throughout the service. The specifics of the incidents are tailored to the appropriate level for the delegates, from fire-related incidents that are resolvable with three appliances, through to multi-agency incidents requiring a tactical or strategic level of command. The delegates have to use their technical knowledge and leadership skills to develop strategies to resolve these incidents, many of which are at the periphery of stipulated OFRS procedure. Not only are the delegates tested, but the validity of many policies and procedures, tactical plans for specific risks and Site Specific Risk Information cards are rigorously tested and explored. The Hydra system provides candidates with a chance to experience the management of incident command within a safe but challenging training setting. Good practice can be identified and shared but mistakes have no operational consequences. Fundamentally, the tasks and exercises set for the delegates during these training sessions are all centred on the “Introspect model”, ensuring that the delegates are made aware of the sequence of dynamic decision making used as a model with OFRS, and of the minimum criteria that they will be measured against during both assessment and incident monitoring.

For the past three years OFRS has used software called XVR produced by a Dutch company (E-Semble) to produce scenarios used both in assessments and development when embedded with the Hydra system. E-Semble is the European market leader in simulation software for the public safety and security sector. The simulation software is used by educators of police, fire and medical services, industry, traffic and tunnel operators in over 22 countries. Using a joystick, XVR allows one or more candidates to walk around in the simulated reality of an incident, and interact with civilians, casualties, other crew members, additional fire officers or emergency services professionals, in a dynamic fashion. The candidate can request actions to occur during their resolution of the incident, which are actioned dynamically by the facilitator. No other simulation software currently on the market facilitates this degree of interaction

with the environment, this also enables OFRS to recreate simulations of actual incidents to use in training, development and debrief sessions.

Scenario development

All of the scenarios developed by OFRS incorporate the same six phases which align directly with the “Introspect model”:

- information gathering;
- incident evaluation;
- objective setting and planning;
- command and control;
- communications; and
- review.

The simulated incidents used in both assessment and development sessions are story-boarded by the team, and the level of complexity agreed to fit the phases above and are relevant to the specific role-map of the candidates. In addition, specific themes and incident types are incorporated to reinforce local and nationally identified training needs. This stems from the data collected during previous assessments, operational incident monitoring, and thematic audits. This benchmarked data allows the organisation to be specific in its identified training needs analysis because the scoring system developed for thematic audits and operational incident monitoring maps the same criteria as the “Introspect model”. This provides a holistic view of the organisational strengths and weaknesses regardless of environment (e.g. training, exercise or operational incident). During this scenario-development phase, an incident recording sheet is developed. This sheet breaks the scenario down into the six phases above, and is used to ensure that each scenario is consistent in its complexity and readily reproducible.

Implementation of the introspect model

All incident commanders within OFRS have to maintain and prove their competence in incident command every two years as stipulated in OFRS policy.

Technical assessment

Initially, each assessment begins with a technical assessment, with questions taken from the operational procedure manual, regional standard operating procedures, and the Department of Communities and Local Government, incident Command Manual, which affirms the appropriate level of technical knowledge of the candidate.

Simulation process familiarisation

The candidates are then given an opportunity to make a topography visit to the XVR environment where their assessment will take place. This gives the candidates an opportunity to get familiar with the functionality of the software, re-affirm how to communicate with virtual crew members and role players, and to get a feel for the environment. This helps put the candidate at ease, and enables them to get a degree of knowledge about the specific environment, akin to their own knowledge of specifics risks, demographics and building types within their station area. OFRS understand that the key to a successful simulation assessment process is immersion and so strive to recreate an individual's recognised environment and chronological processes.

Scenario delivery

The candidate is then given a mobilisation ticket similar to those sent from control for mobilisation to real life incidents. This details information about the incident they are being mobilised to, along with any additional resources which have been mobilised by fire control as part of the predetermined attendance for that incident type. Next, is the “drive-to”, where the candidate is shown a short movie file from the incident commander’s perspective of a fire appliance driving to an incident. This room is laid out to represent a fire appliance, and contains a hand-held radio microphone (to communicate with fire control), a mobile data-terminal, and specific risk information cards as appropriate, all provided to put the candidate in a familiar environment and to facilitate their normal initial information gathering process. At this point one of the facilitators plays the role of other crew members in the appliance. The purpose of the “drive-to” is to help the candidate get immersed within the scenario, and they are encouraged to act as naturally as possible, giving them the opportunity to issue safety briefs and initial commands to the crew. The root purpose of the “drive-to” is to identify the thought processes which the candidates undertake en-route to an incident. This provides evidence that may have gone unseen or not mentioned, as it was only a thought process or consideration that never materialised during the simulation. For example, the candidate might consider the potential for animals or livestock to be involved at a rural/farm incident but because they do not become involved then they never present themselves as a risk and would have remained unmentioned. This does not mean that they were unconsidered instead this demonstrates the thought processes which candidates are carrying out and a more holistic “risk appetite” can be formed by the assessors on the candidate.

Each of the rooms is fitted with audio and visual links to the facilitators control room using closed-circuit television and microphones. This enables the facilitators to monitor the candidate continuously and interact dynamically throughout the assessment. In addition, each of the assessments is recorded to evidence the NDM displayed by the candidate. Once the candidate has arrived at the incident (i.e. the movie file ends), they move to an adjacent room and the dynamic phase of their assessment begins. The candidate is presented with an incident that needs initial action to prevent its escalation. The candidate will then gather information and assess risk within the scenario, evaluate this information and put into place their initial action plan, thereby naturally and subconsciously using the DMM. The facilitators alter the visual stimulus of the scenario using the software to reflect the actions detailed to the crews. They also deliver scripted injects at an appropriate time during the incident to clarify the candidates understanding of the incident or to steer it in a particular direction.

There is always natural variability within the scenarios as a consequence of the individual’s communication and style, and their comprehension and understanding of the scenario. However, through the facilitation this variability is kept consistent by controlling appliance travel times (relative to the geographical location of the incident and the time it would realistically take resources to arrive), crew numbers and their competence levels on additional appliances.

This variability has been questioned by other assessment strategies, however, by keeping everything exactly the same it would be possible to make passing an assessment formulaic rather than dynamic instead, the OFRS ICD team run a diverse array of assessments which can all be resolved by applying the DMM and rationale during the decision-making process. The candidates are assessed on their ability to

make the “right” dynamic decision based on their own knowledge and evaluation of the incident rather than learn how to apply a scripted list of incident decisions which may not fit the particular incident they are faced with.

Scenario debrief and assessment

The ability of the candidate to rationalise their own decisions and to highlight where their score should be awarded, cannot be assessed subjectively by an assessor observing and grading the candidate’s performance. Instead, a thorough debrief is conducted and a professional discussion of the incident is led by the candidate. This debrief is a reflective process, which enables the assessors to understand the candidates evaluation of the incident based on their own knowledge and understanding. For example, the candidate with a greater understanding of a car repair workshop (through prior knowledge of car repair workshops), may ask fewer questions of the key holder during the information gathering phase. This does not mean that their knowledge or hazard awareness is any less accurate than a candidate who quizzes the key holder thoroughly. It also provides evidence to the assessors that the candidate understands the measures of the marking criteria – “You Identified ALL the Major Hazards” – Knowing what constitutes “major” in the context of the scenario is fundamental to improving the candidate’s ability to become “metacognitive” in their thought processes. This also allows the assessors to understand if the individual is making the “right” decision for the “right” reasons – if the candidate has made a decision which would not form the normal response during the incident due to restrictions in software or immersive level of the candidate.

During the debrief process assessors are also able to gauge the candidates risk appetite and how it influences their decision-making process. For example a candidate who attended an incident involving an explosion of an acetylene cylinder may take a very defensive stance at all incidents involving cylinders, regardless of whether the cylinder is involved or near to the fire. However, their experiences don’t make the decision wrong. Instead during the debrief, the facilitators try to assist the candidate in understanding the rationale behind their decisions, to determine if they are making the “right” decisions for the “right” reasons, and whether after a period of review the candidate should have modified their plan.

When a candidate has been unable to explain or identify the rationale behind their decisions they will have failed to effectively take command of the incident. This has generally been caused by macrocognitive overload, leading to decision inertia and/or the observation of numerous cognitive errors. Macrocognitive overload occurs when the individual is grossly overwhelmed by the volume of information coming in; the high demands placed upon them; the need for urgency and an inability to appropriately weigh up the risk/benefit analysis that needs to occur for before any preventable actions can be implemented. This overload leads to indecision and often an inability to make a decision, better known as decision inertia (van den Heuvel *et al.*, 2012; Eyre *et al.*, 2008a).

Our observations mirror those of recent studies of Australian bush firefighters, by Frye and Wearing (2011, 2013). They observed that failure to take appropriate command of an incident was caused by one or more cognitive errors, which could result in significant safety critical errors and subsequently a failure to demonstrate incident command competence. Many individuals assessed using the “Introspect model” were witnessed struggling to accurately evaluate or re-evaluate the incident

and as a consequence were unable to prioritise their actions and commands appropriately. On several occasions individuals failed to appropriately anticipate the progression of the incident or consequences of their actions, or demonstrated too much anticipation, and too little immediate action. Others, who had poor situational awareness and information gathering phases of their assessment, were unable to recognise what information they should gather, and this then had a detrimental effect on their ability to form an appropriate action plan and resolve the incident. Poor delegation and management of the crew were other cognitive errors displayed by candidates struggling to demonstrate command competence. Finally, an inability to form an appropriate action plan was often coupled with a poor incident-review process. These observations suggest the competencies and the cognitive errors found within our simulation accurately reflect those found in the operational environment. Individuals who fail to demonstrate competence will function in a restricted role, support and training is then provided, until reassessment and capability is confirmed, if appropriate.

The specifics of these cognitive errors are very difficult to define or to train for within a traditional classroom setting. Good incident commanders have a natural aptitude for problem solving, have excellent evaluation skills, are concise and clear communicators, with a natural ability to anticipate a situation, and weigh up solutions or options. These individuals are identified through the rigorous selection processes at firefighter level, and then scrutinised at promotional selection tests before becoming an incident commander. OFRS use the “Introspect model” as part of the criteria to identify the “right” people for the role of incident commander. Although these natural aptitudes can’t be taught, they can be practised through simulation and operational incidents until they are natural responses and processes. The assessment debriefs also function as development sessions, to confirm the candidates understanding of their actions, and to re-address any process driven failings. The discussion over “why” they made certain decisions reinforces the candidates understanding and acknowledgement of their own actions, confirming that they were the “right” decisions at the “right” time for the “right” reasons.

Candidates who failed to apply processes stipulated in OFRS procedures, for example, submitting a tactical mode to Fire Control, to time stamp the legally required risk assessment, are much easier to develop and train to rectify these process driven errors. But, importantly, the candidate who understands “why” they should have followed the process in the first place, is more likely to exhibit this process naturally at incidents, rather than desperately trying to remember to apply a process they did not really understand. The “Introspect model” is a merger of cognitive and naturalistic processes, macrocognitive overload can be caused by trying to remember a list of processes that are poorly understood, which inhibits NDM processes and causes decision inertia.

The application of the “Introspect model” of assessment developed by OFRS provides a simulation-based development and assessment tool to identify and monitor nationally recognised competencies, specific to Fire and Rescue Service role-maps. The reflective debrief aspect of the model gives the candidate a specific opportunity to reflect and discuss their own performance with sector-competent facilitators and assessors. The data collected from all assessments are analysed annually, and any trends identified and fed back into the next training year. This introspective review of the assessment process facilitates continuous modification of the model and appropriate development of the incident commanders.

Conclusion

Decision making and command of an incident is a cognitive process. The debrief process used during the “Introspect model” analyses the rationale behind these dynamic decisions through a self-reflective, introspective approach. The candidates therefore gain the ability to see where the decisions they made were “right” and more importantly understand the rationale behind the decisions which made them “right”.

Whilst using the “Introspect model” the facilitators have witnessed many “light-bulb” moments by candidates who, while debriefing and explaining their decisions, have suddenly understood mechanisms related to a process they were doing naturally. Fundamentally, they were making the “right” decisions for the “right” reasons on a subconscious level and demonstrating a state of unconscious competence.

This debrief and self-reflective process, using an understanding of metacognition by the debrief facilitators takes this well-recognised state of competent awareness to a new level. These particular candidates then progress to a conscious awareness of their unconscious competence. Therefore, confirming that they are; the “right” person, making the “right” decisions at the “right” time, for the “right” reasons. Through national implementation of this model, as an example of best practice the performances of incident commanders in risk-critical areas will go from strength to strength, reducing the personal, financial, and moral losses experienced. This will add weight to the acknowledged Fire and Rescue Service mantra of “in a highly calculated manner we will risk our lives to save saveable life” because the calculated manner is about the “right” person making the “right” decision at the “right” time and very importantly for the “right” reason.

References

- Alison, L. and Crego, J. (2008), *Policing Critical Incidents: Leadership and Critical Incident Management*, Willan, Devon.
- Alison, L., van den Heuvel, C., Waring, S., Power, N., Long, A., O'Hara, T. and Crego, J. (2012), “Immersive simulated learning environments for researching critical incidents: a knowledge synthesis of the literature and experience of studying high-risk strategic decision making”, *Journal of Cognitive Engineering and Decision Making*, Vol. 7 No. 3, pp. 255-272.
- Caird, J.K. (1996), “Persistent issues in the application of virtual environment systems to training”, *Proceedings HICS: Third Annual Symposium on Human Interaction with Complex Systems in Los Alamitos*, IEEE Computer Society Press, CA, pp. 124-132.
- Chief Fire Officers Association (2013), “Command qualifications and combined training in the fire and rescue service”, Draft Guidance Document.
- Crandall, B., Klein, G. and Hoffman, R.R. (2006), *Working Minds: A Practitioner's Guide to Cognitive Task Analysis*, MIT Press, Cambridge, MA.
- Crego, J. and Harris, C. (2002), “Training decision-making by team based simulation”, in Flin, R. and Arbuthnot, K. (Eds), *Incident Command: Tales from the Hot Seat*, Ashgate, Aldershot, pp. 266-267.
- Department of Communities and Local Government (2013), Fire Statistics Monitor: England April 2012 to March 2013, available at: www.gov.uk/government/uploads/system/uploads/attachment_data/file/208647/Fire_Statistics_Monitor_April_2012_to_March_2013_final_revised_picture_.pdf (accessed 19 August 2013).
- Dunbar, K. and Blanchette, I. (2001), “The *in vivo/in vitro* approach to cognition: the case analogy”, *Trends in Cognitive Sciences*, Vol. 5 No. 8, pp. 334-339.
- Eyre, M., Alison, L., McLean, C. and Crego, J. (2008b), “Decision inertia: the impact of organisations on critical incident decision making”, in Alison, L. and Crego, J. (Eds), *Policing Critical Incidents: Leadership and Critical Incident Management*, Chapter 10, Willan.

- Eyre, M., Crego, J. and Alison, L. (2008a), "Electronic debriefs and simulations as descriptive methods for defining the critical incident landscape", in Alison, L. and Crego, J. (Eds), *Policing Critical Incidents*, Willan, Cullumpton, pp. 24-53.
- Frye, L. and Wearing, A. (2011), "The central mountain fire project: achieving cognitive control during bushfire response", *Journal of Cognitive Technology*, Vol. 16 No. 2, pp. 33-44.
- Frye, L. and Wearing, A. (2013), "A model of metacognition for bushfire fighters", *Proceedings of the 11th International Conference on Naturalistic Decision Making, Arpege Science Publishing, Paris*, pp. 97-103.
- Glaser, R. and Chi, M. (1988), "Overview", in Chi, M., Glaser, R. and Farr, M.J. (Eds), *The Nature of Expertise*, Lawrence Erlbaum, Hillsdale, NJ, pp. xv-xxviii.
- Home Office (1998), "Dynamic management of risk at operational incidents", available at: www.fire.org.uk/dynamic-management-of-risk-at-operational-incidents-a-fire-service-guide-pamphlet.html
- Klein, G.A. (1989), "Recognition-primed decisions", in Rouse, W.B. (Ed.), *Advances in Man-Machine Research*, Vol. 5, JAI Press, Greenwich, CT, pp. 47-92.
- Klein, G.A. (1998), *Sources of Power: How People Make Decisions*, MIT Press, Cambridge, MA.
- Klein, G.A. (2008), "Naturalistic decision making", *Human Factors*, Vol. 50 No. 3, pp. 456-460.
- Klein, G.A. and Hoffman, R.R. (1993), "Perceptual-cognitive aspects of expertise", in Rabinowitz, M. (Ed.), *Cognitive Science Foundations of Instruction*, Lawrence Erlbaum, Hillsdale, NJ, pp. 203-226.
- Klein, G.A. and Woods, D.D. (1993), "Conclusions: decision making in action", in Klein, G.A., Orasanu, J., Calderwood, R. and Zsombok, C.E. (Eds), *Decision Making in Action: Models and Methods*, Ablex, Norwood, NJ, pp. 3-20.
- Klein, G.A., Ross, K., Moon, B., Klein, D., Hoffman, R. and Hollnagel, E. (2003), "Macrocognition", *IEEE Intelligent Systems*, Vol. 18 No. 3, pp. 81-85.
- Knight, K. (2013), "Facing the future: findings from the review of efficiencies and operations in fire and rescue authorities in England", available at: www.gov.uk/government/uploads/system/uploads/attachment_data/file/200092/FINAL_Facing_the_Future__3_md.pdf (accessed 19 August 2013).
- Kozlowski, S.W.J. and DeShon, R.P. (2004), "A psychological fidelity approach to simulation-based training: theory, research and principles", in Schiflett, S.G., Elliott, L.R. and Salas, E. (Eds), *Scaled Worlds: Development, Validation, and Applications*, Ashgate, Aldershot, pp. 75-99.
- Lipshitz, R. and Shaul, O.B. (1997), "Schemata and mental models in recognition-primed decision making", in Zsombok, C.E. and Klein, G. (Eds), *Naturalistic Decision Making*, Lawrence Erlbaum, Mahwah, NJ, pp. 60-72.
- Murphy, G.L. and Wright, J.C. (1984), "Changes in conceptual structure with expertise: differences between real world experts and novices", *Journal of Experimental Psychology: Learning, Memory and Cognition*, Vol. 10 No. 1, pp. 144-155.
- National Joint Council for Local Authorities Fire and Rescue Services (2009), *Scheme of Conditions of Service* (Grey book), available at: www.fbu.me.uk/workplace/resources/greybook/grey_bookview.php?id=2&PHPSESSID=421755a7a2658ff5ed2a1d85eb678c88 (accessed 28 August 2013).
- Orasanu, J. and Connolly, T. (1993), "The reinvention of decision making", in Klein, G.A., Orasanu, J., Calderwood, R. and Zsombok, C.E. (Eds), *Decision Making in Action: Models and Methods*, Ablex, Norwood, NJ, pp. 3-20.
- Penton, A., Reynolds, J. and Fisher-Morris, M. (2013), "Firefighting – a risky business", available at: www.belvidereconsults.co.uk/root/images/Final%20Full%20May%202013.pdf (accessed 11 September 2013).
- Reimann, P. and Chi, M.T.H. (1989), "Human expertise: human and machine problem solving", in Gilhooly, K.J. (Ed.), *Human and Machine Problem Solving*, Plenum, New York, NY, pp. 161-191.

-
- Skills for Justice Awards News (2013), available at: www.sfjawards.com/News/Oxford-Fire-and-Rescue-Service-is-First-for-Quality-Assurance-Process.html (accessed June 2013).
- van den Heuvel, C., Alison, L. and Crego, J. (2012), "How uncertainty and accountability can derail strategic 'save life' decisions in counter-terrorism simulations: a descriptive model of choice deferral and omission bias", *Journal of Behavioural Decision Making*, Vol. 25 No. 2, pp. 165-187.
- Zimmerman, L.A., Sestokas, J.M. and Burns, C.A. (2011), "Using high fidelity computerised training to prepare commanders for operational decision making", in Moiser, K.L. and Fischer, U.M. (Eds), *Informer by Knowledge: Expert Performance in Complex Situations*, Psychology Press, New York, NY, pp. 201-222.

Further reading

- Fire and Rescue Manual, Fire Service Operations Incident Command, Vol. 3, available at: www.gov.uk/government/uploads/system/uploads/attachment_data/file/7643/incidentcommand.pdf (accessed 28 August 2013).
- Metcalf, J. and Shimamura, A.P. (1994), *Metacognition: Knowing about Knowing*, MIT Press, Cambridge, MA.

About the authors

Dr Katherine Jane Lamb, as part of the Oxfordshire Fire & Rescue (OFRS), Incident Command team (ICD) facilitates, trains and develops incident commanders at all levels of the service. Within this role, she develops and facilitates assessment scenarios, utilising the Introspect model. Before joining the fire service Katherine worked as a Post-Doctoral Researcher, focusing on cell biology, and published and presented data in International Journals, and conferences. When Katherine joined the ICD team, she recognised an opportunity to publish our assessment model and its methodology, Katherine has utilised her analytical skills and experience to present our model for publication. Dr Katherine Jane Lamb is the corresponding author and can be contacted at: katherine.lamb@oxfordshire.gov.uk

Jim Davies as part of the initial ICD team within OFRS, developed and introduced the Introspect model, through six years of ICD facilitation and assessment. Jim also wrote the OFRS procedural documents which supported the assessment and provide it with integrity. As an Operational commander Jim has been in charge of numerous incident types and is able to bring that experience and knowledge to the assessment and development of others. Jim is the Secretary of National Command & Control User Group, and through this forum he offers feedback nationally on incident command and its development.

Richard Bowley as part of the Oxfordshire Fire & Rescue (OFRS), Incident Command team (ICD), facilitates the training of and develops our incident commanders. Richard draws on 34 years of operational experience during the scenario build and assessment debrief. Richard is also the lead HYDRA facilitator with the department, and builds training using this software for all levels of the service. Before joining the ICD team Richard held a tactical position with the organisation and was involved in Multi Agency Contingency Planning (Civil Contingency Act), and Local Resilience Forum – Representing OFRS and Chair of Operational sub groups.

John-Paul Williams facilitates the training and development of our incident commanders, in particular, he uses his specialist rescue experience, during the scenario design and debrief. In addition, John-Paul has acted as subject matter expert to level 2 and 3 Incident Commanders at larger/multi agency incidents involving technical rescue elements. Whilst working with ICD John-Paul has updated our policy and procedural documents, implemented new software into the scenarios and integrated a national qualification into our development courses.