

Training Decision Makers – Tactical Decision Games

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There is growing recognition of the need to train non-technical skills, especially decision making, for emergency management in high reliability industries as well as in contained environments such as prisons. This article presents a training method, Tactical Decision Games, which appears to provide a good opportunity to practise the non-technical skills that would be required in the management of an emergency situation. Case studies from the UK nuclear power industry and the Scottish Prison Service (SPS) illustrate the adaptability and general application of TDGs for training of emergency response teams in a range of operational settings.

Introduction¹

Command and control skills have been a prerequisite for senior personnel in the military and the emergency services for as long as these domains have existed (Brunacini, 1985; Cannon-Bowers and Salas, 1998). More recently, however, it has become evident, following major accidents such as Piper Alpha (Cullen, 1990), that a similar set of skills is essential for emergency management personnel in industrial settings, where the potential for disaster exists in the shape of large-scale loss of life or significant environmental damage (for example nuclear power plants, the offshore oil industry, and mass transportation).

Emergency management is also required in contained environments such as the prison service. Prison riots and hostage taking incidents are extremely volatile and dangerous to manage. The decisions made by individuals or teams are crucial. Hence, the need to train personnel in all these domains to competently manage emergencies, particularly novel emergencies, has been recognised as imperative (HSE, 1994; Flin, 1996). Yet research on such incidents, despite their high media and political profile, remains sparse (Adams, 1994; Rattray, 1999).

Across industries and agencies, emergency management organisations share many of the following features:

- Multi-person systems, with different people and teams having important roles to play in the successful management of an incident.
- Geographically separate units that have key roles to play in the emergency management

process. This leads to high demands for communication and co-ordination.

- Ad hoc teams that work together only when responding to an emergency incident.
- Multiple objectives which have to be achieved in parallel for the incident to be successfully contained.
- High psychological demands, with people working under time pressure and stressful conditions.
- Role specialisation, with the need to pool different types of expertise.

Effective emergency management not only relies upon the knowledge and application of technical expertise and emergency operating procedures, but also depends upon the non-technical skills of the personnel involved in accident management. Response to emergency situations by complex, large-scale organisations demands co-ordination of actions, communication within, between and across teams, and a high level of decision making, often under pressure. Specific competencies or skills for incident command have earlier been reported by Flin and Slaven (1995) following a survey of a variety of organisations where incident command might be required; for example the armed forces, Fire Service, Police force and NASA. Such skills include leadership ability, communication skills, situation awareness, and, of key importance, decision making.

Decision making in emergency situations requires training to increase overall skill levels, to give trainees experience of decision making under stress or by exposing them to stress, and to enhance skills that are particularly vulnerable (Collyer and Malecki, 1998). This paper discusses

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the training of non-technical skills, primarily decision making, required for incident and emergency management, and describes one particular technique, Tactical Decision Games (TDG) (Klein and Wolf, 1995; Schmitt and Klein, 1996). These TDGs may be applicable to a wide range of emergency decision makers.

Naturalistic Decision Making

Naturalistic decision making (NDM) is the term used by psychologists who study decision making in settings characterised by ill-structured, uncertain, dynamic risky environments; shifting, ill-defined or competing goals; and time constraints (Orasanu and Connolly, 1993). In these domains, decisions are usually made by knowledgeable and experienced professionals. Decisions are also embedded in larger dynamic tasks. A short-hand definition of NDM is '... the way people use their experience to make decisions in field settings' (Zsombok, 1997: 4). The goal of NDM research is to examine the way people make decisions under time pressure, shifting conditions, unclear goals, degraded information and team interactions (Klein et al., 1993; Klein, 1997a). Domains of interest for NDM research have included dynamic environments such as flight decks, military operations, firegrounds, medicine and high hazard industries (Flin et al., 1997; Zsombok and Klein, 1997). Within the NDM framework, new decision theories have emerged, such as the decision process model (Orasanu and Fischer, 1997), the cognitive control model (Rasmussen, 1983), and a model of recognition-primed decision making (Klein, 1989; Klein, 1993).²

The Recognition-Primed Decision making model (RPD) was developed through research into decision making by fireground commanders and the military (Klein, Calderwood and Clinton-Cirocco, 1986; Klein, 1989). This RPD model describes the cognitive processes employed by experienced decision makers who may need to make quick decisions in complex, dynamic and hazardous situations, with limited time and information. Decisions may then be based on previous knowledge and expertise, which allows experienced decision makers to recognise a situation as typical and recall the appropriate response to deal with it. The emphasis is on assessing and classifying the situation rather than generating options. With experience, decision makers can usually read the situation so that the selection of a course of action is obvious.

On the basis of the RPD model, Klein and colleagues proposed that effective decision making in real-world situations can be improved through the build up of expertise. Intuitive decision making, based on pattern matching and

recognition of familiar and typical cases, can be trained by increasing the decision maker's experience base (Klein, 1998). Another method is to develop training programmes incorporating exercises and realistic scenarios so that the decision maker has the opportunity to expand their repertoire of patterns (Stokes, Kemper and Kite, 1997).³

Training for Incident or Emergency Management

Effective preparation for emergency response not only depends upon structured planning, but should also be underpinned by training and exercising of all relevant personnel (Home Office, 1997). In most domains, there are limited opportunities to actually experience the demands of incident or emergency management. This is partly due to the low frequency with which incidents and emergencies arise, and partly due to the risk in provoking dangerous situations merely to build up the experience necessary for maintaining a high level of preparedness for possible future events.

The focus of current training in many organisations consists of increasing familiarity and gaining experience in specific task functions; for example with the application and use of procedures, with training for incident command occurring on the job in the form of exercises, drills or real incidents, along with supplementary training at professional training centres (see Flin, 1996 for a fuller description). Three main types of exercise exist: seminar, table-top and live exercise (Home Office, 1997). These types of exercise generally test response organisation effectiveness and the application of procedures, but they are limited in respect of their ability to promote the level of tactical response demanded in situations requiring immediate decisions. Exercises are single incident events and in many cases tend to focus on strategic decision making with the result that tactical and operational skill development is limited. In other words, exercises may not promote the level of immediate response decision making required across a range of different incidents. Additionally, table-top exercises are limited in their ability to provide training in planning and decision making under high temporal constraints or in the dissemination of information, nor in the asynchrony of communication (Dowell, 1995). Disadvantages also include, for example, the cost of emergency exercises in terms of finance and resources; high-fidelity simulators also are expensive to commission, build and install.

Training programmes are useful for imparting the rules and procedures required for skills and knowledge, but it is not necessarily the case that

trainees are taught to make better judgements or decisions (Klein et al., 1997). Being taught to adhere to and apply operating procedures may not provide the opportunity to explore alternative ideas, which may be required when dealing with a novel emergency (Skriver and Flin, 1996). Referring to Ericsson's (1996) comment that the acquisition of any high-level, complex skill is almost entirely a matter of intensive, reflective practice over time, McLennan, Pavlou and Klein, (1999) propose that incident command and control skills can only be acquired, usually via some active process of engagement with the command and control task. Decision making, a vital component of command and control, can improve by learning to deal with specific cases and to approach problems from different angles, by building a repertoire of patterns to assist pattern recognition and associated cues, and by employing training mechanisms to increase individual 'experience' banks (Klein and Wolf, 1995). Experience assists decision makers, in critical situations, to quickly and accurately achieve situation awareness, based on their repertoire of patterns (Stokes et al., 1997), their perceptual abilities at making fine discriminations between cues, and their sense of typical and prototypical cases which permits them to detect anomalies (Klein, 1998).

It may also be the case that training of cognitive skills (for example decision making, problem solving, attention allocation) is overlooked in the design of the training programme. Techniques such as Cognitive Task Analysis can be utilised to identify the essential cognitive skills that support job performance (Seamster, Redding and Kaempfe, 1997). Once these mental processes have been identified, training interventions specifically directed towards enhancing non-technical skills could be developed, leading to improved efficiency and safety, reduced error, and enhanced overall task performance. Supplementary training is therefore required for decision makers, particularly for effective decision making in novel situations such as incidents or emergencies. To be effective, this training is best directed towards increasing expertise by supporting a decision maker's existing strategies rather than teaching new, more formal strategies (Klein, 1997b).

Tactical Decision Games

Tactical Decision Games (TDGs) are a low fidelity training technique which has been developed to improve tactical skill and decision making ability in the military, particularly by the US Marines (Schmitt, 1994).⁴ These 'games' are predominantly based on scenarios ranging in

complexity and technicalities, and are designed to exercise relevant non-technical skills, primarily decision making. A prevailing principle of TDGs is for all participants to develop a shared understanding and recognition of possible problems for emergency management.

A TDG is a simulation of incidents that may occur during emergency response. Participants in the TDG, usually numbering 4-10 individuals, are presented with brief written details of a scenario by a facilitator and take on certain assigned roles. They must then decide upon actions to be taken to manage the situation, which includes a degree of uncertainty. As only a limited amount of time (e.g. two to five minutes) and limited information is initially available, decisions must be made quickly. Key factors in a TDG include:

- *Dilemma* The scenario includes uncertainty and culminates in a dilemma – there is no 'right' answer to the problem.
- *Role Play* The participant(s) take on certain roles, and are required to make a decision to solve the problem.
- *Limits* Only a limited amount of information about the situation is available and only a limited time in which to make a decision.
- *Discussion* Open discussion to allow critique of own decision making and that of other participants.
- *Contingencies* Unexpected events or evolutions are inserted incrementally during discussion. This allows participants to discuss possible consequences of decisions.

The objectives of TDGs can be summarised as follows (Klein and Wolf, 1995; Schmitt and Klein, 1996; Klein, 1998):

- To exercise and practise decision making skills and illustrate key operating principles.
- To boost expertise in decision making and judgement.
- To assist participants to develop a shared understanding and recognition of possible problems.
- To build up a repertoire of patterns which can be quickly recognised and acted upon, particularly during emergency situations.
- To practise non-technical skills such as decision making, communication, situation awareness, stress management, and teamwork.

All participants in the TDG produce their own solution, which they write down. The solution includes their course of action, any instructions they would give, and the reasons supporting their selected course of action. Solutions are then discussed, particularly if different solutions are reached, and the reasoning behind each

individual solution is examined. Feedback, both from the Facilitator and other participants, is immediate. Less experienced or novice role-holders are thus given the opportunity to learn vicariously by listening to more experienced peers. Participants can see how others deal with the situation, and gain insights to add to their own repertoire of patterns of accident management.

TDGs can be either an individual, group or team training experience. Individuals can use TDGs much like crosswords or puzzles, and learn skills such as situation awareness, pattern matching and cue learning. Mental models can be built up, and a greater degree of expertise in managing uncertainty and dealing with time pressures can be acquired. In a group or team session, TDGs foster the development of shared or compatible mental models of the task and the roles of each participant, and, ultimately, skills such as situation awareness and leadership. Interactions between the team members and leader become evident as the participant taking the role of leader makes decisions and gives orders verbally as if for real, communicates the goal and intentions to be taken, co-ordinates activities and looks for acknowledgement from other team members. In a group exercise, participants holding the same role in the emergency response organisation can discuss any variations between solutions generated. Also, participants can be assigned different roles, e.g. leader or other team member, and can practise communicating decisions.

Although not yet formally evaluated as a training intervention, TDGs appear to provide a good opportunity to practise the non-technical skills that would be required in the management of an emergency situation. Unlike full-scale emergency exercises or table-top exercises, participants in a TDG session make decisions and in discussion 'take their decision forward', considering the consequences of a selected course of action, and have the opportunity to compare this with other possible courses of action. TDGs are not script-driven, in that no limits to the decisions that can be made exist. TDGs also allow decision makers to review the reasons *why* they made that decision, rather than only focusing on the decision made.

A great strength of TDGs is that the scenarios used during a TDG session allow participants to sample alternative task strategies, to compile an extensive experience bank, and to enrich experiences. TDGs then appear to assist participants in building up a repertoire of patterns of response, and provide the opportunity to practise recognition-primed, rule-based and knowledge-based decision making. Furthermore, TDGs offer the opportunity to receive immediate feedback from peers about their solutions to the scenarios.

As non-specialist emergency response teams are not normally operational and only function together on an occasional basis, teamwork competencies (knowledge, skills and abilities) are important. Moreover, there is high reliance on the knowledge, skills and abilities of the individual team members. Co-ordination of activities and responses is crucial, and effective and efficient decision making, communication, transfer of information, stress management and teamwork are emphasised. TDGs, as a training strategy, appear to be particularly suitable for enhancing and fostering the required team and individual skills, especially the balance between knowledge-based and rule-based decision making (Rasmussen, 1983) required during accident management.

The role of the Facilitator is crucial to the effectiveness of a TDG.⁵ The role of the Facilitator is to ensure that participants undergo experiential learning. This is the process of learning from experience that shapes and actualises developmental potentialities (Kolb, 1984). Active participation in a session has been shown to improve learning and increase remembering; information is processed more deeply (Bee and Bee, 1998). This information is then more readily and more effectively accessed in a wide range of situations (Dismukes, Jobe and McDonnell, 1997; Human Factors Group of the Royal Aeronautical Society, 1997).

Prime duties of the Facilitator include the introduction of information in an incremental way during the session, including contingencies or unexpected events, assisting participants to analyse their performance and identify how they use non-technical skills to manage all aspects of the scenario, and to provide feedback. Feedback should be critical but constructive, should identify strengths as well as training needs, and should be directed to improving the individual's appreciation of his or her own strengths and weaknesses when working under pressure (Flin, 1996).

Rather than lecturing participants about what they did right or wrong, the Facilitator must encourage TDG participants to analyse their performance on their own and to emphasise self-discovery and self-critique. This approach draws upon the participant's professional experience and motivation to perform well in order to enhance learning. Learning through active participation may also be more likely to be transferred to the work environment.

Case Studies

In view of the promising nature of TDGs as a training intervention for non-military use, their suitability has recently been the subject of

investigation by two dissimilar organisations, namely, the nuclear power generation industry and the Scottish Prison Service. Case studies from these two organisations are presented to illustrate the adaptability and general application of TDGs.

In terms of incident response, a key distinction between these two organisations relates to their use of specialist teams or organisations for emergency management. Incident response at fixed nuclear installations in the UK is mediated by on-site teams consisting of operational personnel who have been specially trained to manage an incident, with input from off-site specialists when required. Such personnel may be called upon to deal with a long-term incident that could possibly last up to two to three days. The Scottish Prison Service (SPS), however, has developed national incident command teams, whose members are often located at different sites throughout the country. It can take up to two to three hours to mobilise this team. One of the consequences of this approach is an over-reliance on specialist teams with a consequent lack of training for those who have to manage an incident until the specialists can deploy (Rattray, 1999).

In both cases, the need for training in the management of dynamic, evolving, and uncertain situations arises. In the nuclear industry, members of the site-based Emergency Response Organisation (ERO) must be adequately trained in the required non-technical skills as well as technical skills for managing any potential incident. SPS personnel, on the other hand, must be trained to deal with a wide range of incidents until the arrival of the specialist team. As Brunacini (1985) reminds us, the first five minutes of incident management may be worth the next five hours.

Scottish Prison Service

Prison managers must face the reality that 'No prison organisation is completely invulnerable to riots and disturbances [...] since it is impossible to precisely predict its occurrence, prison riots should be viewed as unpredictable events (Boin, 1994: 8). This view is shared by other writers; for example, Useem et al. (1995: 16) write, '... comprehensive planning based on awareness of other incidents and lessons learned from the past cannot prevent all prison riots.' Freeman (1996: 11), outlining rules for Correctional Emergency Planning, states, '... planning should be based on the ... assumption (that) an emergency can occur without warning, at any time of the day or night'. Boin and Van Duin (1995: 364) discuss prison riot causalities, and refer to 'secondary causalities', warning that, '... we need to face the possibility that sometimes reactions of officials in

crisis situations may ... add to, rather than prevent the occurrence of factors that contribute to the continuation of the riot.'

At the start of an incident, it is seldom practicable nor possible to stop and read a contingency plan. The requirement is for intuitive decision making. Whilst prison incidents can escalate very quickly, they are not common. Opportunities to develop skills from real incidents are limited. Consequently, a model for initial response training was required, over and above existing training methods, e.g. emergency exercises, which would not involve significant resources, from which first on-scene responders could develop decision making skills, and which prevented escalation. Tactical Decision Games met these organisational needs.

The first attempt at running a TDG at HMP Peterhead was tentative. The process was based on notes taken from a conference address by Gary Klein (1997c). A group of six Supervisors and three Unit Managers were chosen to participate in an experiment using the TDG approach. Supervisors are in charge of discrete parts of the prison and are responsible for initial incident response at the operational/tactical level. Unit Managers cover the Duty Manager role at weekends and evenings. In the absence of the Governor or Deputy Governor, they take the role of Incident Commander at the tactical/strategic level. At the first training event, the incident scenario, which had to be credible in the eyes of the participants, was presented as follows:

It is 20.30 on a Friday night in December. You (the Supervisor) are in your office counselling a prisoner who is distraught after receiving news that one of his family has been killed in a car crash whilst en route to the prison for a visit; the prisoner also has a history of suicidal behaviour. Suddenly, an officer bursts into your office and tells you there is a fire in the top-flat ablutions area. There are 64 unlocked prisoners and five officers in the hall.

The participants had to answer two questions:

- What are you going to do?
- How are you going to do it?

Participants were given approximately 5 minutes to write down their answers. The Facilitator then asked each in turn for their response after which conclusions were drawn during group discussion. The Facilitator is exactly that; the role is not to judge right or wrong but to facilitate the process of drawing conclusions. Consequently, the Facilitator should have good questioning skills. Examples of questions included:

- Why take that particular action?
- What could be an alternative consequence of that action?

- What drew you to that conclusion?
- What other options were there?
- What considerations were foremost in your mind?
- What tactical principle were you following?
- What assumptions did you make?

In this way participants clarified actions. A plausible continuation of the incident was then presented, based on the agreed actions of the participants. In this way they had to live with and manage the consequence of their actions. For example:

Action is taken as agreed from Scene A. You are five minutes into the incident. The evacuation number count is two down and an officer has slipped on the stairs and is unable to move his leg. The hall has rapidly filled with smoke.

The process outlined above was repeated. This was followed by a learning review, using a model adapted from Kolb's (1984) learning cycle, whereby participants reflected on the experience, drew conclusions on what they had learned to do more of/less of new things and articulated how they would achieve this. This approach aims to encourage decisiveness and acceptance of responsibility. If, however, the objective is to develop pattern recognition, then, using the same TDG scenario, questions such as the following would be used:

- What are the immediate presenting issues?
- In what ways could this situation develop/escalate?

Alternatively, another objective can be role clarification, in which case the questions would be:

- How would you expect your staff to respond?
- How would you expect the Supervisor/Duty Manager to respond?

The experience gained from facilitating TDGs suggests that, initially, one objective for the learning event is sufficient. As experience with the approach develops, it is possible to ask all six questions thereby encouraging action, pattern identification and role clarification in the same TDG. However, participants new to incident management training can be overwhelmed if too much is expected too soon, particularly if participating for the first time with colleagues familiar with the approach. Regular repetition of this approach leads to the development of a significant mental experience bank whereby decision making at the start of actual incidents becomes intuitively based on recognition of development patterns.

There is an extensive range of short scenarios that can be used to develop intuitive decision making to cope with the first few minutes of an

incident. For example, hostage incidents, attempted escape, attempted suicide, gang fights and sit down strikes, provide a variety of options for games. TDGs are 'lo-tec' and do not demand huge resources; they can be run in an hour and only require an overhead projector, paper, and pencils.

Coincidentally, the effectiveness of TDGs as a training tool has since been tested at HMP Peterhead. Three weeks after the first TDG was run, a major fire, deliberately started by a prisoner, engulfed a residential accommodation hall. At the de-brief, the Supervisor reported that the TDG had significantly helped his mental state of preparedness and that decisions came easily. This example promoted the 'street credibility' and confidence in the TDG approach, which in turn created a demand that outstripped the supply. The most difficult incidents to manage are hostage incidents. Consequently, a TDG was developed for a hostage situation. By coincidence, a hostage incident occurred three days after the game. The incident was considered serious enough to call in a national team. Given Peterhead's geographical isolation from the central belt of Scotland, 100 miles north, the Incident Command Team (ICT) took four hours to deploy. The local team managed the situation during that four hours and, again, at the local de-brief the Supervisors reported that the experience gained through participation in TDGs allowed them to operate with confidence based on understanding the command structure, role expectations and tactical principles which otherwise they would not have had. They reported increased confidence, better understanding of the nature of crisis management, less reliance on standard operating procedures, willingness to take risks and learn with colleagues.

With this feedback and the consequent desire generated for TDGs as a training intervention, a shared model for initial crisis response was constructed based on promoting the use of tactical principles across a range of different incidents by abstracting common elements raised to a level of generality. In this way, first on scene responders could apply a set of easily remembered tactical principles to guide their actions. The mnemonic 'CRISIS' was developed to serve as the memory aid for tactical principles. Six easily remembered tactical principles were clarified. This provided a flexible framework within which decisions could be made using a common, shared and understood response language. The mnemonic works as follows:

- **'C' for Containment** – *where* do I isolate and secure the incident scene (evacuate, lock-up, cordons). The outcome of containing the incident is that it restricts incident movement

by controlling SPACE thereby preventing escalation. Containment requires:

- **'R' for Resources** – *who* do I deploy (concentration vs. economy)? As a result, resources are used effectively to sustain response (e.g., rioters/hostage takers cannot rotate and refresh). Resource management allows:
- **'I' for Initiative** – *which* is appropriate: intervention, negotiation or nothing? The result is that the incident begins reacting to the commander's intent. Power perceptions are altered as order replaces disorder. Initiative requires:
- **'S' for Surprise** – *when* do I seize and exploit the initiative as incidents are TIME competitive? The result is that time advantage switches to the commander. Surprise requires:
- **'I' for Intelligence** – *what* is the motivation? What are the strengths, weaknesses, opportunities or threats? The result is enhanced freedom of action. The whole response requires:
- **'S' for Security** – are staff, keys, radios, prisoners accounted for? Are plans, equipment, communications protected? Are risk assessments done? Are instructions clear on evidence protection?

Using this mnemonic for training prison staff, in conjunction with TDGs, high levels of retained learning were reported. The staff found that a set of principles helped them adapt and respond quickly to any incident rather than searching for the contingency plan checklist. Importantly, the use of principles developed the pattern recognition approach by mentally simulating incidents. It is not suggested that TDGs only should be used, but they seem to be effective in organisations where resources for initial incident response training is limited.

Over the past two years, several variants have been used, not least of which is 'situational recognition' whereby participants deploy to the presented scene and walk through the incident. The same mnemonic as shown above has been presented as a memory aid for the principles of situational recognition. The success of TDGs as a training intervention has led to the situation where TDGs are currently being devised and experimented with for national incident command teams in the Scottish Prison Service.

Nuclear Power Industry

In a manner similar to the Scottish Prison Service, TDGs are currently being developed as a training intervention for the nuclear power industry in the UK, particularly for use with emergency response organisation personnel (Flin

and Crichton, in progress). The UK nuclear power industry regularly undertakes full-scale emergency exercises as well as a variety of other training interventions for emergency response personnel. However, following a literature review to investigate training interventions for accident management training, encompassing recent research into emergency decision making in the offshore, aviation, military and industrial environments, including the nuclear industry world-wide, TDGs were recommended as a novel training interventions (Flin, Skriver and Crichton, 1998). Their suitability for the UK nuclear industry arises as they allow participants to build up their experience repertoires through vicarious learning from other possibly more experienced personnel. In addition, when conducted as a team session, TDGs allow the members of an ad-hoc team to meet, discuss and practise principles of emergency management. As the TDG workbook is currently in the process of evaluation, only results from a preliminary testing session can be reported.

A preliminary testing session was conducted at a fixed nuclear installation in the UK. Participants included six personnel who would hold specific roles in response to an incident or emergency. The session consisted of an introduction to the concept of TDGs, a brief explanation and description of the non-technical skills that would be required during an emergency, a non-domain scenario and a domain-based scenario.

The non-domain, military, scenario (Schmitt, 1999) was included to introduce participants to the fact that the non-technical skills under discussion, e.g. decision making, situation awareness, communication, teamwork, and stress management, are equally relevant to and required by any emergency situation. Participants were asked to take on the role of a Tank Division Commander, and to decide where and how to deploy the Division when faced with enemy troops. Although no personnel had any previous military experience, all participants were motivated to take part in the session. Feedback was very positive. This non-domain scenario acted as a 'warm-up' to the domain-based scenario.

Following a short debrief and discussion about non-technical skills, a nuclear plant scenario was presented. The scenario had been designed and developed with input from Subject Matter Experts (SMEs) and was therefore realistic and credible. The scenario was approximately 300 words long, in the form of a story, and included background information, some of which may be 'noise' i.e. irrelevant information, as well as technical data. The scenario ended with a dilemma. Participants were allocated to their roles as required by the scenario.

Examples of questions initially asked were:

- What are you going to do?
- Quickly list your actions and the reasons for those actions.
- What are your main priorities and why?

Throughout the scenario discussion further questions can include:

- What do you understand your focus to be?
- Prepare any briefing/message that might be required.
- Describe the make up of any team you might deploy.
- What special resources (e.g. equipment, materials, etc.) or arrangements (e.g. medical assistance, etc.) might be required?
- How would you deal with 'X' (e.g. Fire Officer/Police) when s/he arrives on scene?

In addition, to increase realism and pressure, during the first period allowed for participants to consider and write down their solution, the Facilitator caused distractions. The reason being that operational or tactical decisions are seldom made without disturbances or disruptions. Examples of distractions included:

- Continue to talk during the period when participants have been asked to write down their solutions.
- Walk around the room and look over the participants' shoulders.
- When reading individual solutions, make comments (e.g. 'Would you really do that?'; 'Interesting'; etc.)
- Decrease the time allowed for decision making, i.e. if the participants have been advised that they have 3 minutes in which to make a decision, shorten this, without warning, to 2 minutes.

Throughout the scenario discussion, the Facilitator also introduced a number of unexpected contingencies and events in order to allow participants to fully explore the consequences of any decisions. Principles of emergency management were introduced, as well as the application and use, or not, of Standard Operating Procedures (SOPs).

Although participants were able to fully discuss any relevant matters and issues raised throughout the session, and during a group discussion at the end of the session, a Cognitive Critique exercise was also conducted at the end of the session. This learning tool allows participants to consider and discuss which decisions were the most difficult, and why; their selected course of action; which events most influenced the decision; and any information which either helped or hindered the decision making process. Finally, participants also reflected on what they would do differently in

this situation again, as well as the biggest weakness in the exercise, the biggest strength, and what important lessons could be learned from the exercise.

Participants were then asked to complete an individual feedback questionnaire, and general feedback was obtained from the group as a whole in an open discussion. In both instances, feedback was very positive, as all participants commented that this type of training session allowed them to exchange ideas; to consider various options; to learn from the experiences of others; to gain insight into other people's roles; and to identify issues not previously considered; furthermore that it was enjoyable. Weaknesses in the exercise generally referred to the absence of procedures to resolve either industry or agency issues raised during the session.

General Conclusions

Following a series of high-profile incidents in the 1980s and 1990s (e.g. Piper Alpha; Channel Tunnel; Chernobyl) it is generally accepted that training in command and control skills is required by personnel who may be called upon to manage emergency situations. Although many different interventions and mechanisms currently exist to present such training (for example, emergency exercises, table-tops, and even computer-based training programmes) the need still exists for supplementary training in non-technical skills. Tactical Decision Games are a low-cost, low-fidelity training intervention but offer a range of benefits and opportunities to practise and exercise the non-technical skills required for effective emergency management.

Maximum benefits from TDG sessions are accrued through repeated practice, as principles of tactical decision making can be learnt and applied in context. A repertoire of patterns can be built up, which can quickly be recognised and acted upon during an emergency situation. By repeatedly working through scenarios of incidents, participants should learn to make better decisions, i.e. quickly and efficiently, enhance their ability to assess situations, build up a repertoire of patterns, and gain an increased knowledge base of the application and use of procedures and principles (Klein, 1998). The aim should be to practise TDGs on a regular basis, i.e. once a month, either on a group or team basis to enable non-technical skills to be fostered.

The two case studies presented in this paper illustrated the adaptable nature of Tactical Decision Games. They can readily be generalised to a variety of different domains, but are particularly appropriate for any organisation or agency that may be required to deal with emergencies or incidents. Preliminary testing

sessions appear to support the effectiveness of TDGs in enhancing and fostering tactical decision making. Participants have reported quicker and more efficient decision making, improvements in communication, and in planning. Benefits also include reports of increased confidence in personal abilities to manage emergency situations as a result of repeated participation. However, further empirical data must be collected to allow TDGs to be evaluated as a training intervention. TDGs may be refined as our understanding of decision making in these naturalistic contexts increases.

Notes

1. The views presented here are those of the authors and should not be taken to represent the position or policy of the organisations involved. The nuclear power case study is based on a project funded by the UK Nuclear Industry Management Committee (HF/GNSR 5007). We thank Mr J. Schmitt, and personnel from British Energy Generation Ltd and the Scottish Prison Service for their excellent co-operation and assistance.
2. This approach to decision making has also seen the development of new programmes for training critical decision making. For example, Cohen, Freeman and Thompson (1997) devised a 'critical thinking' programme; Fallesen et al. (1996) developed a 'Practical Thinking' programme based on NDM.
3. Klein and colleagues have since developed and implemented a decision skills training programme for the US military, specifically devised to train squad leaders to handle a variety of decisions during a field exercise (see Klein, 1998, for a further description).
4. TDGs have been formally integrated into a decision skills training programme for US Marine Corps squad leaders (Klein et al., 1997), whose initial scepticism changed to enthusiasm, with reports that the participants '...felt more prepared to make difficult decisions under uncertainty and time pressure' (Klein, 1998: 107). When training for cognitive tasks or procedures, high transfer from training to real-life can be achieved with simulations of low physical fidelity (Patrick, 1992).
5. The use of a trained Facilitator has been found to positively affect the performance and interaction of groups (Oxley, Dzindolet and Paulus, 1996).

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