

## Training for decision making during emergencies

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**Abstract:** As crises or emergencies occur unexpectedly and without warning, the non-technical skills of the emergency response personnel are as crucial as their technical skills. This is particularly true in complex, large-scale organisations. This paper outlines a novel, low-fidelity, training method, Tactical Decision Games (TDGs), that is designed to enhance the non-technical skills required for effective emergency management. These skills include decision making, communication, situation awareness, teamwork and stress management. It is anticipated that emergency response personnel will be better prepared, more equipped, and more able to deal with the demands endemic in any incident response situation as a result of repeated exposure to TDGs, which encourage learning through experience and directed practice.

**Key words:** human factors, training, emergency management, non-technical skills, decision making

## Vadba procesov odločanja v kritičnih situacijah

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**Povzetek:** Ko pride do kritične situacije ali nevarnosti brez predhodnega opozorila, so t.i. netehnične veščine ekip za posredovanje prav tako pomembne kot njihove tehnične veščine. To še poseben drži za sestavljene in obsežne organizacije. Prispevek izpostavlja novo metodo usposabljanja, imenovano *igre taktičnega odločanja*, ki je načrtovana tako, da poudari netehnične veščine, ki so potrebne za učinkovito upravljanje kriznih ali nevarnih situacij. To so veščine odločanja, komuniciranja, zavedanja situacije, skupinskega dela in spopadanja s stresom. Predvideva se, da bo osebje, odgovorno za delovanje v nevarnih situacijah, po zaslugi ponavljajoče vadbe z igrami taktičnega odločanja, ki vzpodbujajo učenje preko izkušnje in neposrednega praktičnega dela, bolje pripravljeno, opremljeno in zmožno spoprijemati se z zahtevami, s katerim se srečujejo pri nesrečah, krizah in nevarnostih.

**Ključne besede:** človeški faktorji, usposabljanje, upravljanje z nevarnostjo, netehnične veščine, odločanje

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Crises (natural or man-made), as well as civil turbulences or terrorist actions, can be characterised by “‘un-ness’ - unexpected, unscheduled, unplanned, unprecedented, and definitely unpleasant” (Rosenthal, Comfort & Boin, in press). Incidents in high reliability organisations, for example, nuclear power installations (Mould, 1988; Three Mile Island Special Inquiry Group, 1980), offshore oil production installations (Cullen, 1990), and public transport (Channel Tunnel Safety Authority, 1997), have indicated the need not only to identify the crucial non-technical skills required by incident management personnel for effective emergency response, but also to develop training methods to exercise and enhance these skills. Non-technical skills, such as co-ordination of actions, communication, and decision making, sometimes under pressure, by both individuals and teams, as well as situation assessment, and stress management, greatly influence incident management (Rouse, Cannon-Bowers & Salas, 1992). Indeed, the possibility of inadequate performance by incident management personnel, especially during the opening stages of the emergency, may have a strong impact on the subsequent evolution of the event (Fahlbruch & Wilpert, 1999; Flin, 1996; Lagadec, 1993).

In many settings, emergency response organisations (EROs) consist of a multi-person system, with different people and teams having important roles to play in the successful management of an incident. These teams are often formed on an ad-hoc basis and work together only when responding to an emergency incident. In addition, these teams often require role specialisation, with the need to pool different types of expertise. Units within the system that have key roles to play in the emergency management process may be geographically separate, leading to high demands on communication and co-ordination. Such circumstances create high psychological demands, with people working under time pressure and stressful conditions. Decision making in emergency situations requires to be trained 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 & Malecki, 1998).

This article discusses training of the non-technical skills required for effective emergency management and introduces a novel training method, Tactical Decision Games (TDGs), designed to exercise relevant non-technical skills, especially decision making. It is suggested that the development, introduction and use of TDGs, in terms of their adaptability and flexibility, can assist improved incident management through increased knowledge and understanding of tactical concepts, techniques, development of a repertoire of situations, and development of implicit understanding.

## **Training for emergency management**

Characteristics of emergencies or crises include uncertainty, information (ranging from overload to ambiguous or missing), time pressures, the dynamic nature of the event, and, in particular, heightened levels of stress (Brehmer, 1996; Flin, 1996). While

organisational, managerial and individual factors contribute both to the causes of accidents (Fahlbruch & Wilpert, 1999; Reason, 1997), and the quality of the ensuing emergency response, the opportunity for human error and inadequate team competence are particularly high during critical incident management. Individual errors identified in previous incidents have included inadequate situation assessment, weak leadership, erroneous decision making, blind adherence to procedures, and adverse stress reactions, whereas teamwork errors have included role ambiguity resulting in tasks 'falling through the cracks', a lack of explicit co-ordination and communication problems (Rouse et al., 1992). As effective emergency management by complex, large-scale organisations demands co-ordination of actions, efficient communication within, between and across teams, and a high level of decision making, sometimes under pressure, relevant training issues therefore involve both technical and non-technical, i.e. social and cognitive, skills. From a psychological perspective, such issues include effective and efficient decision making, accelerated proficiency, and the development of expertise in individuals and teams, both co-located and distributed.

Stressors arising from incident command, such as dynamic events, time pressure, high risk and inadequate information, have a severely detrimental effect on performance, for example, leading to cognitive biases in decision making such as attentional tunnelling, lack of concentration, and poor assessment of the situation (Orasanu, 1995; Svenson & Maule, 1993; Wickens, Stokes, Barnett & Hyman, 1993). However, Klein (1996) suggests that a more intuitive or recognition-based decision making mode used by experienced incident commanders is more resilient to stress effects. With increasing expertise, gained through experience or training, incident commanders and command teams will have developed a more organised knowledge base covering a broad range of situations (Ericsson & Smith, 1991), allowing them to deal more readily with uncertainty and unfamiliarity (Orasanu, 1997).

Training methods are thus required to enhance expertise and improve teamwork skills, i.e. the skills necessary for team personnel, irrespective of role and task within the team, for example, decision making, communication, shared situation awareness, and co-ordination, to ensure efficient team functioning (Brannick, Prince & Salas, 1997; Flin, 1996). In addition, incident commanders require supplementary training in skills such as decision making, situation assessment, leadership, planning, communication, and stress management (Flin, 1996; Pigeau & McCann, 2000).

One particular training method specifically directed towards improving team performance, particularly during emergency response, is Crew Resource Management (CRM) (Wiener, Kanki & Helmreich, 1993). CRM is not only applicable in situations where teams are operational on a daily basis, but is a particularly effective type of training for teams which only come together in response to an incident or situation, as occurs in many EROs. With its emphasis on non-technical training, focusing on leadership, command, decision making, communication and teamwork (Orasanu, 1993), CRM has been found to be particularly effective in improving team

performance. There are dual benefits in CRM training - one is to improve human performance and teamwork in order to minimise the risk of emergencies or accidents occurring; the other is that CRM should help teams to perform more efficiently once an emergency has occurred. Although initially designed to reduce operational errors and improve emergency response performance in aviation, there is increasing evidence that CRM can be adapted for other high reliability team settings such as offshore oil industry (Flin & O'Connor, 2001), aviation maintenance (Marx & Graeber, 1994), and anaesthesia (Gaba, 1992).

Training incident commanders traditionally tends to take the form of exercises or drills (see Flin, (1996) for a fuller description). In the UK, three main types of exercise are seminar, tabletop and live exercise (Home Office, 1998). Whereas these types of exercises vary in terms of cost effectiveness, and generally test response organisation effectiveness and the application of procedures, they are limited in respect of their ability to promote the level of immediate tactical decision making required, primarily by incident commanders. Training programmes are often 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, McCloskey, Pliske & Schmitt, 1997). Moreover, being taught to adhere to and apply operating procedures may not provide the opportunity to explore alternative ideas that may be required when dealing with a novel emergency (Skriver & 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, P. (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 & Wolf, 1995). Experience assists decision makers, in critical situations, to quickly and accurately achieve situation awareness, based on their repertoire of patterns (Stokes, Kemper & Kite, 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 the training of cognitive skills, for example decision making, problem solving, attention allocation, and so forth, is overlooked in the design of the training programme. Training objectives must be determined on the basis of the cognitive skills underlying expert performance. Techniques such as Cognitive Task Analysis can be utilised to identify the essential cognitive skills that support job performance (Seamster, Redding & Kaempf, 1997). Once these mental processes have been identified, training interventions specifically directed towards enhancing non-technical skills can be developed, leading to improved efficiency and safety, reduced

error, and enhanced overall task performance. Appropriate domain-related training will facilitate cognitive processes, according to Means, Salas, Crandall and Jacobs (1993), however such training does not rely upon physical fidelity to the task, but does require psychological fidelity, i.e. that participants learn in the context of practising domain-relevant decisions in task context. Simply learning knowledge is not sufficient, but successful performance occurs through applying the knowledge actively in a large variety of contexts (Farmer, van Rooij, Riemersma, Jorna & Moraal, 1999). In order to be effective McLennan, et al (1999) comment that training in incident command should be directed towards the psychological demands that typically confront incident commanders, involving four elements:

- Provision of a simple, robust conceptual scheme of incident command
- Opportunity to actively practise incident command in a setting that adequately simulates the psychological demands on the commander
- Provision of feedback about the effectiveness of command and control decisions and actions
- Opportunity for guided reflection and self-appraisal

As supplementary training is required for incident commanders, particularly for effective decision making in novel situations such as incidents or emergencies, training is best directed towards increasing expertise by supporting a decision maker's existing strategies rather than teaching new more formal strategies (Klein, 1997). Tactical Decision Games (TDGs) have been specifically designed with this in mind.

### **Tactical Decision Games (TDGs)**

In complex, hazardous, real-world environments, particularly emergencies, decisions tend to be made by knowledgeable and experienced decision makers, and are embedded in larger dynamic tasks. The decision maker must balance personal choice with organisational norms and goals. Intuitive decision making, allowing quick and effective decisions to be made, is based on pattern recognition skills gained through experience (Klein, 1998). However, as emergencies in complex, large-scale organisations, such as nuclear power plants or petro-chemical installations, tend to be extremely rare, the opportunity to practise decision making in such situations seldom arises, and little actual experience is gained. Therefore the optimal manner to develop and improve intuitive decision making and related skills is through repeated decision making experiences in context. One possible novel intervention for crisis management training is that of Tactical Decision Games (TDGs) (Schmitt, 1994).

A Tactical Decision Game (TDG) is a low-fidelity facilitated simulation of incidents that may occur during an emergency, and are designed to exercise decision making skills and to illustrate key operating principles.

TDGs comprise of scenarios, ranging in complexity and technicalities, that end with a dilemma which participants have to resolve. Key aspects of a TDG are:

1. Dilemma: The scenario culminates in a dilemma – there is no ‘right’ answer to the problem, and participants must produce a solution.
2. Role play: Participants take on certain roles and make decisions in terms of that role.
3. Limitations: Decisions are made on the basis of only a limited amount of information and within a limited time frame (e.g. 2 minutes).
4. Critique: Decisions are discussed and critiqued – open discussion amongst participants is encouraged to allow vicarious learning.

TDGs act as a substitute for actual experience and provide a suitable, yet low fidelity, opportunity to enhance skill development and expertise. The objectives of TDGs can be summarised as (Klein, 1998; Klein & Wolf, 1995; Schmitt & Klein, 1996):

- 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.

A prevailing principle of TDGs, however, is for all participants to develop a shared understanding and recognition of possible problems for emergency management. To enhance learning and increase expertise, it is essential that participants in the TDGs analyse and evaluate what happened, going beyond simply naming the strong and weak points of their own performance. Powerful insight can be gained by analysing *why* decisions were made or actions taken, including factors that either enabled or hindered their success.

TDGs can be either an individual or 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, as well as the recognition of typical cases and patterns through experience. Mental models can be built up, and a greater degree of expertise in managing uncertainty and dealing with time pressures 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. In a group exercise, partici-



pants holding the same role in the emergency response organisation can discuss any variations between solutions generated. In a team-based exercise, participants can be assigned different roles, e.g. leader or other team member, and can practise communicating decisions. 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.

Training in decision skills, through identification of the decision requirements, doing exercises with tactical decision games, and critiquing the exercises, has been found to boost expertise in decision making and judgement. TDGs have also 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: p 107).

### **The role of the Facilitator**

The Facilitator is crucial to the effectiveness of a TDG session as a training method, to the smooth functioning of a TDG session, and to assist participants to gain maximum benefit from this training intervention. The use of a trained Facilitator has been found to positively affect the performance and interaction of groups (Oxley, Dzindolet & Paulus, 1996). In the TDG session, the Facilitator’s responsibility is to ensure that participants undergo experiential learning. Kolb (1984) comments that this is the process of learning from experience that shapes and actualises developmental potentialities. Active participation in a session has been shown to improve learning and increase remembering, also information is processed more deeply (Bee & Bee, 1998). This information is then more readily and more effectively accessed in a wide range of situations (Dismukes, Jobe & 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, involving 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 in any training environment 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.

### **Format of a TDG session**

Typically a TDG training session consists of at least one prepared scenario, either presented to participants in text form or read aloud by a Facilitator, and is roughly 2-3 paragraphs long. The purpose of the 'story' is to provide participants with a background to the situation, however, the information given may be inadequate, misleading, or extraneous, moreover the scenario always culminates in a dilemma. This is accompanied by a 'map' (shown on an overhead) detailing the location, or suspected location, of the incident. Participants take on certain roles, and a limited amount of time and information is initially available. The requirement is that a plan to solve the incident is formulated. Participants are encouraged to illustrate their decisions about movements of personnel or materials on the overhead, and to provide realistic briefings as would be required.

All participants in the TDG produce their own solution, which 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 hear how others deal with the situation, and gain insights to add to their own repertoire of patterns of accident management.

The emphasis, during initial questioning and discussion, relates to which decision would be selected and how this decision could be achieved. Moreover, participants have to explain why they selected that particular decision, in terms of their main priorities. During subsequent discussion, further questioning includes asking participants to prepare any briefing or message that may be required, describing what resources they may utilise, and how they would manage other aspects of the incident, for example, dealing with representatives of external agencies. Contingencies, i.e. unexpected events, are also inserted during the discussion of solutions.

The duration of each scenario exercise should be a maximum of 1 hour 30 minutes, involving both a discussion of the incident, feedback and debriefing. Heightened stress levels are imposed as the Facilitator, a key role in TDGs, uses a variety of distractions during the decision making period, e.g. reduces the decision making period without warning, and introduces contingencies or "what if's" during the presentation of individual solutions. Contingencies should be credible, but realistic. Participants should be given the opportunity to discuss what they would do in these various circumstances. Solutions reached and decisions made are discussed within the group,



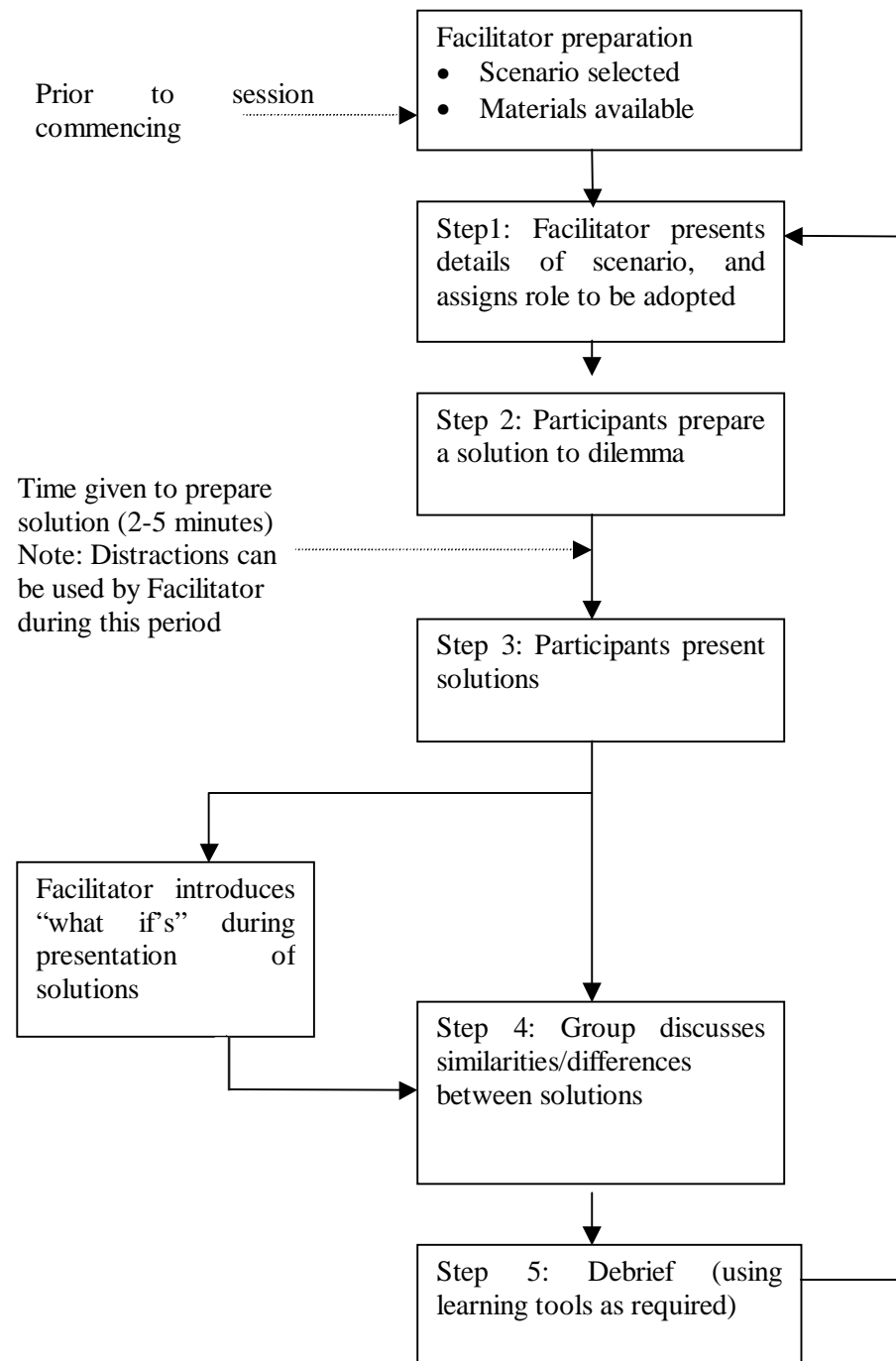


Figure 1: Format of a TDG session

Table 1: Additional learning tools (Pliske et al., 1998)

<b>Learning Tool</b>	<b>Description</b>
<i>Decision Making Critique</i>	Explore important cues that might have been seen earlier, assessments that were mistaken, and the types of uncertainties encountered and how they were handled. <ul style="list-style-type: none"> <li>• Why they made the decisions they did</li> <li>• What information and events influenced decisions</li> <li>• What factors helped or hindered decision making</li> </ul>
<i>Decision Requirement</i>	Key judgements and decisions are identified, and the reasons why these decisions were difficult can be discussed.
<i>Pre-Mortem</i>	Key vulnerabilities in a plan can be identified. <ul style="list-style-type: none"> <li>• What could have caused the plan to fail</li> <li>• What reasons are there for the failure</li> <li>• What critical flaws may have affected decisions</li> </ul>
<i>Commander's Intent</i>	The Team Leader describes his/her intent (goals and focus) and how he/she would expect the team to react. Simultaneously, the team members detail how they think they would react. The two interpretations can then be compared.

and any differences deliberated. Additional learning tools (shown in Table 1) can also be used to fully unpack decisions made and examine the reasons underlying such decisions.

### **Advantages of Tactical Decision Games**

It is recognised that, in common with other training interventions, TDGs contain both advantages and disadvantages. Advantages of TDGs are that they are relatively inexpensive, allow the participant(s) to learn how to deal with specific cases and approach the problem from different angles, and are suitable for use by a variety of different personnel who may be called upon to manage a crisis or emergency. Additional advantages include that communication improves as participants learn to recognise key words and phrases used, allowing more implicit and effective communication. Team performance improves as leaders learn to phrase their briefings and instructions more effectively and to describe their intent in a clearer and more concise manner. Moreover, team members are given the opportunity to provide feedback about briefings and instructions given. Ultimately, however, by repeatedly working through such incidents, participants learn to make better decisions, i.e. quickly and efficiently, as well as gaining an increased knowledge base of the application and use of procedures, often through to the termination of the incident.

A great strength of TDGs is that the scenarios used 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 (Klein, 1993; Rasmussen, 1983). Furthermore, TDGs offer the opportunity to receive immediate feedback from peers about their solutions to the scenarios. Unlike full-scale emergency exercises or tabletop exercises, participants in a TDG session make decisions and, during 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 behind *why* they made that decision, rather than only focusing on the decision made. A repertoire of patterns can be built up through repeated practice and exposure to TDGs. These patterns can then quickly be recognised and acted upon during an emergency situation. TDGs also provide the opportunity for improved learning as participants consider, discuss, and reflect upon the solutions presented by other, possibly more experienced, peers.

However, one of the main disadvantages of TDGs is that there is no guarantee of transfer from training to real-life occurs. Tactical Decision Games (TDGs) have been integrated into a Decision Skills Training programme for the US Marines (Klein et al., 1997) and for firefighters (Pliske, McCloskey & Klein, 1998), but although responses have been very positive, the impact of the training was difficult to assess due to limited opportunities for follow-up, therefore no formal evaluation data is available.

More recently, preliminary results, generally anecdotal, based on the development and introduction of TDGs in such diverse environments as prisons and nuclear power plants, appear to support the effectiveness of TDGs in enhancing and fostering tactical decision making (Crichton, Flin & Rattray, 2000; Crichton, Rattray & Flin, 2000). Participants have reported quicker and more efficient decision making and improvements in communication and team functioning. One important reported benefit is increased confidence in personal abilities to manage emergency situations as a result of repeated participation. In addition, advantages at an organisational level are gained as the TDG encourages discussion of current procedures and planning for incident response, identifying potential gaps in knowledge or training, or areas requiring clarification or modification.

A further disadvantage is that the effectiveness of the TDG depends upon effective facilitation. As discussed previously, the role of Facilitator is crucial to the effectiveness of a TDG session as a training intervention, to encourage and motivate participants to explore decisions, to consider consequences of actions, and to identify relevant emergency management issues. Moreover, in common with other training methods, constructive and directed feedback is vital for TDGs to provide effective

training. However, feedback does not necessarily lead to acquisition of knowledge, and the trainee must be psychologically open to, receptive of, and reflective about the feedback message in order to alter performance (McLennan et al., 1999). The Facilitator must therefore be adequately skilled in debriefing and providing feedback to TDG participants.

Further empirical research, conducted either with members of the emergency services or an industrial emergency response organisation, requires to be undertaken to allow TDGs to be fully evaluated as a training intervention. The potential benefits of TDGs, either as a stand-alone non-technical skills training intervention or as part of a command and control training programme, similar to the a program of instruction on 'practical thinking' developed for the US military (Fallesen, 2000), can only then be fully determined, specifically aspects such as the amount of training required, and generalisation.

### **Integrating TDGs into emergency training**

Across industries, training for emergency management generally consists of a mixture of classroom-based training, manuals, and emergency exercises. Each of which can appear costly in terms of preparation and organisation. One of the advantages of TDGs, however, is that they are a low-fidelity training technique, requiring minimum preparation or any specific aids other than a prepared scenario, a room, and a group of participants. TDGs can therefore be conducted on-site, as and when a group of participants can meet. Moreover, they can be integrated into classroom-based training modules to allow trainees to increase familiarity with and to practise non-technical skills. Although the emphasis is on non-technical skill development, TDGs also allow technical or procedural aspects of emergency management to be covered during discussion.

TDGs also provide the opportunity to discuss emergency response, principles and procedures. Such discussions allow issues that require clarification to be raised, and can have a long-term positive effect on emergency preparedness and planning, as matters that may have previously been overlooked or misrepresented can be resolved.

### **Conclusion**

It is increasingly being recognised that the social and cognitive skills of those personnel who are required to manage unplanned incidents, and in particular, to work effectively under stress, are crucial (Flin, 1996; Flin, Salas, Strub & Martin, 1997). As effective emergency management not only relies upon the application of technical expertise and emergency operating procedures, but also depends upon the non-tech-

nical skills of the teams involved in accident management, TDGs would appear to offer a useful supplementary intervention for high reliability organisations. Response to emergencies by complex, large-scale organisations demands co-ordination of actions, efficient communication within, between and across teams, and a high level of decision making both by individuals and teams, sometimes under pressure. The goal of TDGs is to allow participants to practise and exercise such skills in context. For example, additional TDG learning tools such as Commander's Intent, where leaders can practise giving briefings or instructions, and team members can provide feedback regarding their interpretation of the briefing or instruction, have been specifically developed to exercise communication between leaders and teams.

It is generally accepted that critical decisions and actions often need to be taken during emergency situations under stress (Cannon-Bowers & Salas, 1998; Flin et al., 1997). Task demands can not only have a crucial effect on decision making by the individual, but can also constrain the behaviour of teams, forcing them to change their pattern of communication, distribution of tasks, and style of decision making, which can give rise to serious errors (Mumaw, 1994). On an individual basis, errors can be prevented by knowledge of procedures and training in decision making skills to master, reduce or tolerate the demands of stressful situations, and to ensure that problems can be managed before critical consequences ensue. TDGs help train individual skills such as situation awareness, pattern matching and cue learning, as well as the recognition of typical cases and patterns through experience. Mental models can be built up, and a greater degree of expertise in managing uncertainty and dealing with time pressures acquired.

Furthermore, group or team participation in TDGs fosters the development of shared or compatible mental models of the task and the roles of each team member, and, ultimately, teamwork skills such as situation awareness and leadership. By tailoring training to the needs and requirements of each of role within a team, building on a foundation of generic training in terms of the relevant industry base, team members will be trained to carry out their individual roles within the team and the organisation as a whole in a more effective and efficient manner. TDGs also provide the opportunity to clarify the duties and responsibilities of different roles in the emergency response organisation.

In conclusion, it is anticipated that participation in TDGs should provide simulated experience of coping with a serious upset condition, such as taking an overview of the situation (the 'big picture'), maintaining hands-on detachment (working at a strategic as opposed to tactical level), and making decisions under stress (both time and risk). Repeated participation in TDGs can provide the practice required to maintain competence and knowledge in contexts where little actual experience is gained. By learning through experience and directed practice the non-technical skills required for effective incident command, both for teams and individuals, members of an ERO will be better prepared, more equipped, and more able to deal with the demands

endemic in any accident response situation.

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