Background briefings on emerging issues for fire managers from AFAC and Bushfire CRC.

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FIRE NOTE

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INVESTIGATING PERCEIVED TEAMWORK EFFECTIVENESS IN INCIDENT MANAGEMENT TEAMS

Research has shown (e.g. Cannon-Bowers & Salas 1998) that teams comprised of highly skilled individuals working in dynamic environments (such as military or aviation) have, under certain circumstances, failed as teams, sometimes with devastating ramifications. This research aims to identify the factors that create high performing teams which collaborate well and can achieve high quality results.

SUMMARY

This Fire Note reports on the preliminary findings of a PhD study which is investigating teamwork effectiveness in Incident Management Teams (IMT) that are undertaking simulation training. Data was collected from across four states in Australia from 13 Incident Management Teams. Pre and post training questionnaires were distributed to 240 Incident Management Team personnel. Included in the questionnaire were two questions that related specifically to teamwork effectiveness. Based on the teamwork effectiveness post scores, the IMTs were divided into two groups. The training sessions where the post scores increased became Group A. The training sessions where the post scores decreased became Group B. Results showed that Group A with perceived higher teamwork effectiveness communicated more effectively than Group B. These results have implications for IMT training.

BACKGROUND

Emergency service agencies have a culture of safety and require high performing teams. Incident Management Teams work under intense pressures in situations that demand high levels of accountability for their decisions. They perform complex tasks in rapidly changing environments, where strong teamwork is essential. Given these characteristics, it is not surprising that there is increasing evidence that many problems can occur in team performance effectiveness. Problems in information flow, coordination of activity and shared understanding have been highlighted in a range of bushfire enquiries and reports (e.g. Esplin 2003).

There is a large body of research (e.g. Bowers et al 1998; Cannon-Bowers & Salas 1998; Schaafstal, Johnston & Oser 2001) that has examined the role of communication practices of team members and teamwork behaviours that are important in improving performance. This literature demonstrates that high performing and highly reliable teams employ different communication patterns than less effective teams. These patterns include their use of acknowledgments, planning statements, questions and directives.

These communication patterns enable team members to successfully draw on their cognitive resources, which range from information sharing to team feedback skills and team-mate knowledge, all of which foster, within the team, a common understanding of the situation.

METHODOLOGY AND ANALYSIS

Pre and Post Training Questionnaires

Data was collected from 13 Incident Management Teams that were undertaking routine training across four states (Victoria, Queensland, New South Wales and

ABOUT THIS PROJECT

This project, D5 Enhancing Emergency Incident Management Team Effectiveness and Organisational Learning, is part of Bushfire CRC Program D: Protection of People and Property.

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Tasmania). The training aimed to provide intellectually demanding tasks where participants could see and hear events in a simulation that matched the conditions of a real fire. The training sessions ran between half a day to two and a half days continuously (that is, between one and six shifts). Each session had between 10 and 29 participants.

Of the participants, 62% had less than five years' experience in IMTs and 62% had attended fewer than five similar training sessions. Almost all (99%) of the participants thought that the training was either very likely or somewhat likely to reflect what they might face in a real fire (see Figure 1, right). The overwhelming majority of participants (91%) thought that the training was either medium complexity or high complexity (see Figure 2, right).

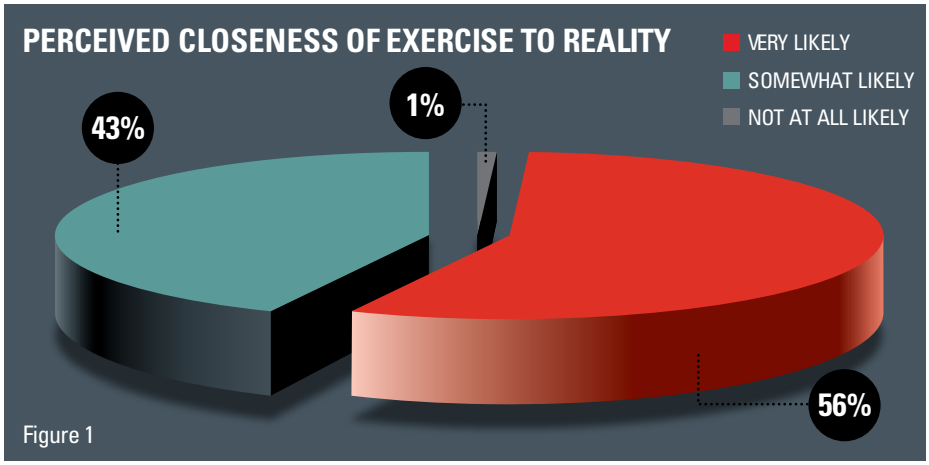

Figure 1

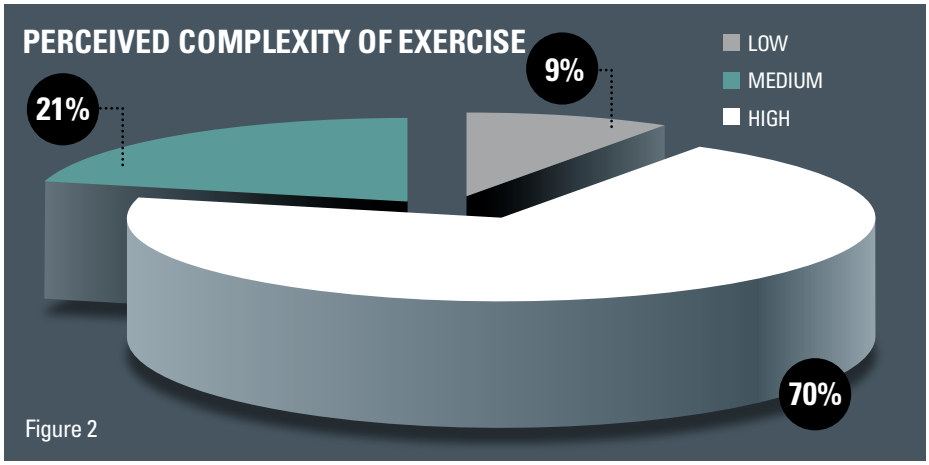

Figure 2

Methodology

Pre and post training questionnaires were given to all 240 IMT participants; the questionnaires included demographic data, perceptions about the exercise and measures of teamwork effectiveness. The questionnaires were adapted from concepts that were discussed in four different publications investigating teamwork effectiveness (e.g. Vogus and Sutcliffe 2007; Gully, Incalcaterra, Joshi & Beaubien 2002).

The statements in the questionnaires sought to identify perceived teamwork activity (that is, the processes that individuals use to coordinate their decisions and activities, such as sharing information and resources to attain shared goals), self-confidence, collective confidence and confidence in leadership. Each variable was measured on a Likert scale where participants were able to answer questions on a scale of 1-7 where 1 = "not at all" to 7 = "very great extent". There was an additional point for participants to answer "don't know".

Analysis

All data was entered into a quantitative analysis software program called SPSS. There were four steps undertaken to obtain the results that are reported here. They were:

1) Two variables – '*In this IMT we will achieve effective outcomes* and *'In this IMT the team will work well together'* – were combined into a 'teamwork effectiveness' construct.

2) A reliability test was undertaken which suggested very good internal consistency for the construct with this sample (Pallant 2007).

3) A split file based on the construct 'teamwork effectiveness' was created. The training sessions where the post test scores had *increased* on the construct were combined into one group, Group A, which had 134 participants. The training sessions where the post test scores had *declined* on the construct were combined into another group, Group B, which had 76 participants. One training session with 30 participants showed no change so this was not included in subsequent analysis. It should be noted that not all participants responded to all questions.

4) Ranking tests compared the participants' scores prior to training and after the training and were run on variables that related to teamwork activity, leadership, self-confidence and collective confidence.

TABLE1: A COMPARISON OF PRE AND POST TRAINING RESPONSES

		Group A			Group B		
		Median	N	Significance	Median	N	Significance
Question 1	understanding each other's responsibilities (pre)	4.00	115		3.00	53	
	understood each other's responsibilities (post)	5.00	111	.0001	4.00	62	.0001
Question 3	discuss difficulties (pre)	5.00	110		5.00	53	
	discussed difficulties (post)	6.00	110	.010	5.00	61	.529
Question 6	discuss mistakes found (pre)	5.00	112		6.00	54	
	discussed mistakes found (post)	6.00	108	.351	5.00	61	.009
Question 14	ability to adapt to change (pre)	5.00	111		5.00	56	
	adapted to change (post)	6.00	105	.001	5.00	58	.520
Question 18	IMT will achieve goals (pre)	5.00	113		5.00	56	
	IMT achieved goals (post)	6.00	95	.008	5.00	57	.281

PRELIMINARY FINDINGS

The results show that after the training there was a statistical difference on five variables.

Table 1 (above) reports on the variables that showed a statistically significant difference. The questions on the left provide the variables pre and post training. The Group A column in the middle shows the scores that relate to the group with higher perceived teamwork effectiveness than Group B. The set of figures on the right show the scores that relate to Group B.

Both groups A and B showed that there was a statistically significant increase in scores in the variable 'W*e have a good understanding of each other's responsibilities*' (see Question 1 in Table 1). The group A median difference score increase was 1. The group B median difference score increase was also 1.

Group A had a statistically significant increase in the scores on the following variables:

- *It will be easy to discuss difficulties we encounter to achieve the best outcome* (Question 3 in Table 1). The median difference score increase was 1.
- *I am confident in the team's ability to adapt to changes in task or goals* (see Question 14 in Table 1). The median difference score increase was 1.
- *I am confident that the IMT will achieve the goals it sets* (see Question 18 in Table 1). The median difference score increase was 1.

Group B showed a statistically significant negative difference in the variable *'If and when mistakes occur, we will discuss openly and as directly as possible how we might address them'* (see Question 6 in Table 1). The median difference score decrease was 1.

END USER STATEMENT

"We always like to think we are doing a good job but sometimes it is worthwhile having a fresh set of eyes to look at us.

"Clearly if agencies can improve incident management teams through better teamwork and communications we will *all* be able to deliver better operational results."

Chris Arnol,
Former Acting Regional Chief,
Tasmania Fire Service

There were two questions in the questionnaire relating to leadership. They were:

- *'I am confident the Incident Controller will invite input from other IMT members.'*
- *' I am confident the Incident Controller will make good decisions.'*

Although changes in these variables were not statistically significant some important insights were revealed.

Prior to undertaking training both groups' median scores on these variables were slightly higher than other variables, indicating that both groups had reasonably high confidence in their Incident Controllers. Post training, however, both groups' perceived confidence levels in their Incident Controllers had reduced slightly, especially in Group A.

As Group A had perceived higher teamwork effectiveness than Group B an inference could be drawn that the Incident Controllers did not constrain teamwork activity. One possible explanation of this is that the Incident Controllers did not invite input from other team members to a 'great extent' because they encouraged shared leadership. Shared leadership uses team members' knowledge, skills and attributes to make good decisions.

CONCLUSION

The results show that Group A (with perceived higher teamwork effectiveness than Group B) had a more positive experience during the training with positive statistically significant changes in four variables.

The findings show that it is important for team members to have a sound understanding of each other's responsibilities. In addition, groups that create a more positive, open climate by communicating effectively (e.g. by discussing difficulties) perceive that they do better on a range of indicators. These communicative practices appear to be linked to collective efficacy (for example, having the ability to adapt to changes in tasks or goals) and group potency (such as achieving the IMT's goals).

MASTERY LEADS TO HIGHER PERFORMANCE

Information from this PhD study will emphasise to trainers, leaders and IMT members the importance of mastery in the following areas which will lead to higher performing Incident Management Teams:

- Skills such as communication skills, attitudinal responses and social interaction that will foster teamwork.
- Team situation awareness – enables team members to share an up-to-date understanding of the situation, the environment, and a team member's role in a shared task.
- Shared leadership – the delegation of leadership to other members to draw on their strengths (such as knowledge, skills and attitudes) that will encourage the team to adapt to situational demands.
- Team affective states – the team's attitudes, perceptions and beliefs that play a role in the team's functioning, learning and psychological safety.

FUTURE DIRECTIONS

These results are consistent with research findings in other high reliability industries (e.g. Schaafstal et al. 2001). Higher performing teams communicate well and, in the process, develop flexibility and adaptability to be able to perform more successfully as teams and achieve higher levels of team and task outcomes.

It is inconclusive as to whether the training alone has caused the increase or decrease on the teamwork activity and subsequent performance because there are a number of other factors that may have influenced the results. As these results are preliminary, further analysis is being conducted on the relationships and influences between leadership, self-confidence, collective confidence and teamwork effectiveness.

FURTHER READING

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AFAC is the peak representative body for fire, emergency services and land management agencies in the Australasia region. It was established in 1993 and has 26 full and 10 affiliate members.