

# FIRE NOTE

ISSUE 73 JANUARY 2011

## SUMMARY

This Fire Note synthesises selected research investigating information flow and Incident Management Team (IMT) effectiveness in emergency events and canvasses some of the strategic implications. The research has included a survey of 780 personnel engaged in fire and emergency services work. The research indicates that the original functional purpose of the Incident Control System (ICS) used in Australia (Australasian Inter-Service Incident Management System or AIIMS) and its complement in New Zealand (Coordinated Incident Management System or CIMS) works well, particularly in predictable and routine emergency events. There is, however, evidence to suggest that AIIMS/CIMS processes are strained under conditions of escalation; when emergencies are complex and when there are high numbers of people involved and where such incidents involve supporting agency coordination. The review undertaken suggests that, in terms of strategic implications, changes in various parts of the AIIMS/CIMS system may be useful and also require differing levels of intervention.

## ABOUT THIS FIRE NOTE

This Fire Note is based on the Bushfire CRC project Enhancing Information Flow and IMT Effectiveness.



The author is Dr Christine Owen, of the University of Tasmania.

## DEFINITIONS

**Re-aligning:** to readjust something so that it is correctly oriented to fit changed circumstances.

**Reforming:** to change or improve something.

**Re-engineering:** the examination and modification of an existing process or system in order to improve it.

# STRATEGIC IMPLICATIONS FOR INCIDENT CONTROL SYSTEMS IN AUSTRALIA AND NEW ZEALAND

## CONTEXT

**Effective incident management organising/coordination must be structured in ways that allow people to effectively share what they know, coordinate their activities/responses, and adjust to the conditions in a way that is both dynamic and suitably responsive. A key question addressed in this research then is to what extent personnel perceive that the processes within AIIMS/CIMS enables or constrains their capacity to do so.**

## BACKGROUND

One of the key issues arising from the 2009 Victorian Bushfires Royal Commission was whether organisational changes would benefit or hinder future emergency management response.

The research reported here represents the first systematic national review of the emergency Incident Management System to be conducted since its introduction in Australia and New Zealand. It points to where strategic change can be implemented to improve organising for emergency management.

The challenge is to better understand the extent to which existing approaches to emergency incident management support effective communication practices, information flow, and coordination, as well as the extent to which the existing system enables and/or constrains the organisational flexibility that might be needed in escalating and complex situations. The research conducted included strategies to obtain emergency management personnel perceptions about ICS in fire and emergency management of natural disaster events, and their satisfaction levels with the organisational principles underpinning ICS.

## END USER STATEMENT

“Our systems of incident management are crucial to the way fire and emergency services achieve their mission in the community. AIIMS is the bedrock of our Incident Management System.

“Recent experience and research suggest that our system of incident management needs to continue to mature and adapt as the emergency management context that we work within continues to change. Changes to our systems must be evidence-based and be undertaken in an inclusive and collaborative manner. The principles and practices that support incident management systems need to be flexible, functional and fit for purpose. Systems need to be increasingly adaptable to meet contemporary needs of users.

“The research reported here is critical to help us to understand the changes needed for moving forward and to working smarter, not harder.”

– Euan Ferguson, Chief Officer, Country Fire Authority, Victoria.

## BUSHFIRE CRC RESEARCH

The purpose of the research has been to:

- Review information and communication flows.
- Review how teams work with the AIIMS/CIMS systems.
- Identify opportunities for improvement.

Research over the past four years has included interviews with 130 personnel experienced in emergency incident management; six

## FURTHER READING

Owen C & Dwyer I. (2009) Review of Incident Management Teamwork and multi-agency collaboration. Report for the Bushfire CRC available online at: <http://www.bushfirecrc.com/people/christine-owen>

Dwyer I & Owen C. (2009) Emergency incident management: An evolving Incident Control System framework, *Journal of Pacific Rim Psychology*, 3 (2). pp. 66-75. ISSN 1834-4909. Available online at <http://eprints.utas.edu.au/9515/>

Walker G, Stanton A, Salmon P & Jenkins D (2009) *Command and Control: The Sociotechnical perspective*, Ashgate, Aldershot UK

observations of real-time emergency events, as well as 18 exercise simulations of incident management in four states (Queensland, New South Wales, Victoria and Tasmania), and a survey of 780 personnel who have worked within 25 agencies representing all Australian states and territories and New Zealand.

The survey component included a number of questions which were the same as items included in a 2003 questionnaire conducted by the Australasian Fire and Emergency Service Authorities Council (AFAC) as a precursor to the formal adoption of the Australasian Inter-service Incident Management System (AIIMS) as the national system in Australia. This meant it was possible to make comparisons with the 2003 baseline data, which provided insights into how the system had evolved over the past five years. For details of the data collection, reporting and analysis please see Owen & Dwyer (2009).

In the survey, personnel were asked to report on an incident they were involved with and give their assessment of the AIIMS/CIMS processes at work. This meant that an evaluation could be made of information flows:

- Prior to the arrival at the incident.
- On arrival at the incident.
- During the incident.

The survey data were *Factor Analysed*, which meant that survey items that were correlated could be grouped into factors and normalised scores could be generated, allowing direct comparison across factors. A summary of the factors extracted from the analysis can be found in Table 1. These factors were then used to indicate perceptions about different aspects of emergency management operations in different parts of the system. The levels included on the fire- or incident-ground, within an Incident Management Team as well as within a regional or state level of coordination.

TABLE 1: DESCRIPTION OF FACTORS IDENTIFIED IN THE ANALYSIS

<b>Team working</b>	The processes, decisions and activities that individuals use to coordinate their behaviour, including information sharing and resources to attain shared goals.
<b>Seeking weak signals</b>	Proactively looking for all small warning signals and openly discussing them in a constructive manner.
<b>Shift resources</b>	The resources available on the shift that were available to meet logistical requirements, including fatigue management and continuity of information between shifts.
<b>Temporal responsiveness</b>	The capacity of the IMT to respond and meet needs in a timely way.
<b>Distributed sense making</b>	The capacity for communication between the IMT and the Incident Ground to share information and risks in a constructive manner.
<b>Flexibility</b>	The capacity to be able to adapt performance strategies quickly and appropriately to changing task demands.
<b>Systemic Capability</b>	The organisational capacity supporting lateral and horizontal sharing of information so that it is timely and effective and supports effective decision-making and confidence in safety processes.
<b>Personnel Capability</b>	The level of confidence personnel have that their training and informal knowledge of the incident provides them with sufficient familiarity with incident management systems in use including policies and procedures and confidence to do what needs to be done.
<b>Organisational Impediments</b>	The degree to which personnel experienced demands where they needed to go outside normal procedures and/or outside of the chain of command; and where they experienced contradictions in policies guiding the management of the incident.
<b>Inter-operability</b>	The technological systems, policies and procedures and culture that enables the effective inter-operability between agencies.

Table 2 shows the functional work units operating with the Incident Control Structure cross-tabulated with the indicators developed. In the table, the rows represent each of the factors identified through the Factor Analysis process and the columns represent each of the work groups in operation within the ICS structure. The Table represents a colour-coded synthesis of all data analysed. It identifies key areas proposed for intervention in order to improve emergency incident management performance. Table 3 shows the responses for those personnel who also said “yes” to the question “During the shift did you experience any factors that prevented you from being able to effectively do your job?” The table provides indicators of systemic tension when personnel are under pressure.

## RESEARCH OUTCOMES

There is a high level of engagement and support for AIIMS-related practices reported in the data. Firstly, in terms of information flow prior to the arrival at an incident, 73-76% were aware of the role they were to

perform; knew who to report to on arrival and were able to report to that person. Secondly, in terms of information flow upon arrival at the incident, 80% of personnel received a briefing.

The third area of comparison is information flow during the incident and in particular the use of tools such as Incident Action Plans. The use of Incident Action Plans has increased slightly since 2003. However, the receipt of Incident Action Plans is still relatively low (55% received such a plan).

However, one in every three personnel also reported that they experienced factors that inhibited them from being able to effectively carry out their job. The rest of the synopsis discusses potential areas for improvement summarised in Tables 2 and 3.

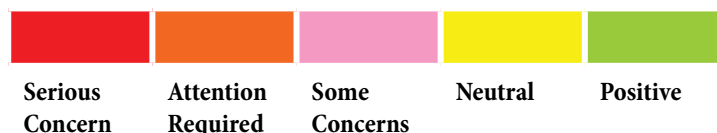
## On the fire- or incident-ground

The concerns of personnel on the fire- or incident-ground are, not surprisingly, for resources. Also highlighted are concerns regarding securing needed support from the IMT in a way that is temporally responsive.

TABLE 2: DIAGNOSIS OF INCIDENT MANAGEMENT TEAMWORK AND COORDINATION

		State Coord	Regional Coord	IMT IC/ Officers	IMT Func units	Div/Sec Comm	Crew/ Strike
Within Teams	Team-working	Positive	Neutral	Some Concerns	Some Concerns	Positive	Positive
	Weak Signals	Positive	Positive	Positive	Neutral	Some Concerns	Neutral
	Shift Resources	Attention Required	Positive	Neutral	Neutral	Some Concerns	Some Concerns
	Temporal responsiveness	Positive	Some Concerns	Neutral	Neutral	Attention Required	Serious Concern
Between Teams	Distributed Sense-making	Neutral	Positive	Some Concerns	Some Concerns	Some Concerns	Some Concerns
	Flexibility	Positive	Positive	Neutral	Some Concerns	Attention Required	Some Concerns
Intra-organisational	Systemic Capability	Positive	Neutral	Neutral	Some Concerns	Attention Required	Attention Required
	Personnel Capability	Positive	Serious Concern	Neutral	Neutral	Neutral	Serious Concern
	Organisational Impediments	Serious Concern	Some Concerns	Neutral	Neutral	Some Concerns	Attention Required
Inter-organisational	Inter-operability	Positive	Positive	Neutral	Some Concerns	Neutral	Neutral

KEY:



**Incident Management Teams**

IMTs are comprised of smaller functional units that sometimes have considerable difficulty in getting their own needs met from the “core” IMT members here called IMT Officers (i.e. the Incident Controller, Operations Officer, Planning Officer and Logistics Officer). Personnel working within functional units of the IMT reported lowest levels of satisfaction with interactions supporting distributed sense-making (see Table 1) between the IMT and the fire-ground. There is a need to strengthen the interconnections between planning and operational functional units within the IMT because it is between these two units where the first disconnects and coordination breakdowns occur.

At IMT officer level, the analysis indicated a need for better inter-operability in technical systems, policies and procedures and supporting culture. This is likely to require better systems connections within the ICS (between the IMT and regional/state levels of coordination) but also and between the IMT and other supporting emergency

arrangements (e.g. Municipal Emergency Coordination Centres) and other supporting agencies.

**Regional levels**

People working at a regional level suffered most from concerns about personnel capability. They reported lower levels of certainty of what needed to be done; with familiarity with the incident management systems being used at that level and understanding about who to contact for information or expertise. These indicate a lack of definition and ambiguity of the regional coordination function and of its roles within the overall Incident Management System.

**State levels**

The State level (in New Zealand this is the national level) had the highest reporting of experiencing *organisational impediments*. This was also mentioned in the interviews conducted where it was evident that coordinating demands at this level emphasise – in addition to the demands associated with control – a need for a different way of coordinating that is more closely associated

with building relationships in multi-agency networks.

In the survey, personnel at a state level reported experiencing higher levels of contradictions in policies; experienced higher levels of competing demands; reported a greater degree of having to go outside normal procedures as well as being asked to go outside the chain of command.

**HOW THE RESEARCH IS BEING USED**

These results show how the activity of emergency incident management transforms into different sets of demands depending on the location of work teams within the AIIMS/ CIMS structure and the demands of the incident. Areas for potential improvement can also be considered in terms of the degree of change needed to address the issue identified.

The research also provides guidance about areas that could be targeted to achieve improvements in incident management work and organisation. By reviewing perceptions about the teamwork, coordination and organisational processes, the data

**TABLE 3: TEAMWORK AND COORDINATION WHEN PERSONNEL STATED NOT BEING ABLE TO EFFECTIVELY DO THEIR JOB**

		Above IMT	IMT Officers	IMT Func Units	Div/Sec Comm	Crew/ Strike
Within Teams	Team-working	Positive	Some Concerns	Neutral	Neutral	Neutral
	Weak Signals	Neutral	Some Concerns	Attention Required	Neutral	Positive
	Shift Resources	Positive	Neutral	Neutral	Some Concerns	Attention Required
	Temporal responsiveness	Positive	Neutral	Neutral	Attention Required	Neutral
Between Teams	Distributed Sense-making	Neutral	Some Concerns	Some Concerns	Attention Required	Some Concerns
	Flexibility	Positive	Neutral	Some Concerns	Attention Required	Attention Required
Intra-organisational	Systemic Capability	Some Concerns	Neutral	Neutral	Neutral	Serious Concerns
	Personnel Capability	Attention Required	Some Concerns	Some Concerns	Attention Required	Attention Required
	Organisational Impediments	Positive	Some Concerns	Neutral	Attention Required	Attention Required
Inter-organisational	Inter-operability	Some Concerns	Neutral	Some Concerns	Attention Required	Serious Concerns

**KEY:**



**Serious Concerns**      **Attention Required**      **Some Concerns**      **Neutral**      **Positive**

analysed provides a systematic evaluation and diagnostic framework for areas for improvement and suggests different levels of possible intervention.

In some areas all that may be necessary is a **realignment** of policy or an articulation of job functions, for example articulating operational roles and reviewing relationships within functional units within the IMT. Other issues may require greater change or reforming processes, for example building better ways of sharing more timely information between the

IMT and the fire-ground. Finally, there may be greater changes needed which indicate a need to **re-engineer parts of the system**. For example, at a state (Australia) and national (New Zealand) level the coordination systems and processes may need to be **re-engineered** to create appropriate processes to support effective multi-agency coordination networks in incident management.

**FUTURE DIRECTIONS**

These results show how the activity of emergency incident management translates

into a different set of demands depending on the location of work teams within the AIIMS/CIMS structure. These require a need for greater flexibility and responsiveness in coordination structure to service both vertical and horizontal information flows within the command and control structure, including integration with other agencies that also have emergency management responsibilities so that communities may be supported.

Fire Note is published jointly by the Bushfire Cooperative Research Centre (Bushfire CRC) and the Australasian Fire and Emergency Service Authorities Council (AFAC). This Fire Note is prepared from available research at the time of publication to encourage discussion and debate. The contents of the Fire Note do not necessarily represent the views, policies, practices or positions of any of the individual agencies or organisations who are stakeholders of the Bushfire CRC.

Bushfire Cooperative Research Centre  
Level 5/340 Albert Street  
East Melbourne VIC 3002  
Telephone: 03 9412 9600  
www.bushfirecrc.com

Bushfire CRC is a national research centre in the Cooperative Research Centre (CRC) program, formed in partnership with fire and land management agencies in 2003 to undertake end-user focused research.  
Bushfire CRC Limited ABN: 71 103 943 755

Australasian Fire and Emergency Service Authorities Council  
Level 5/340 Albert Street  
East Melbourne VIC 3002  
Telephone: 03 9418 2388  
www.afac.com.au

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 35 full and 10 affiliate member organisations.