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Guidelines for enhancing Incident Management Team communication in Incident Control Centres

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Executive Summary

This report and accompanying guidelines were developed and submitted as BCRC Project D5 Commonwealth deliverable 22.2.3: *Guidelines developed for enhancing Incident Management Team communication in Incident Control Centres.* This report also complements a related piece of work on enhancing incident management communication through enhanced teamwork performance which is reported in Deliverable 22.1.4 *A review of the strengths and weaknesses of observed IMT training with recommendations for improvement.*

A number of internal and external reviews and inquiries have identified the need for improvements in the facilities used as Incident Control Centres during a bushfire response. This report was produced to assist those with responsibility for establishing an Incident Control Centre to do so in such a way as to facilitate the exchange of clear, accurate and timely information. The report was based on information, and data, gathered during 2006 and 2008 by the D5 BCRC research team at the University of Tasmania.

The report:

- Uses observational research to identify how Incident Control Centres could be improved to assist the flow of clear, accurate and timely information.
- Uses the AIIMS defined goals as the basis for understanding whether the Incident Control Centre is facilitating or impeding the work of the Incident Management Team.
- Brings together the observations of both researchers and practitioners in order to suggest practical guidelines for the establishment of an Incident Control Centre.
- Identifies six interconnected and interrelated areas of Incident Control Centre and Incident Management Team facilitation that require attention.
- Provides visual examples of many of the areas and issues identified as important.
- Provides a series of guidelines designed to assist those with responsibility for establishing an Incident Control Centre.
- Provides the rationale for the development of a checklist of actions that can be taken by those responsible for the establishment of an Incident Control Centre.

The report identifies the following six areas which relate to the material configuration of the buildings utilized and the associated technologies associated with obstructing and/or hindering Incident Management Teams in their capacity to manage information in a clear, accurate and timely manner. The six areas identified are:

1. Building size and configuration
2. Role, Unit and Section identification
3. Movement of people
4. Fixed technologies
5. Shared information display
6. Lessons learned

The report also has a section, *Further comments*, that provides some of the additional suggestions and feedback that was obtained from experienced Incident management personnel during the consultation phase of the report and accompanying guidelines, which do not fit within the scope of the current report but are interrelated issues.

Building size and configuration

It was observed that the configuration of the facilities played a significant role in the way that the Incident Management Team was arranged. Rooms were often too small or too big. It was observed at some locations that relatively large rooms sometimes supported multiple IMT functional areas, and at other locations rooms of similar (or even larger) size supported only one function.

It was observed that at some locations the Planning and Operations Sections were located within close proximity of each other; in recognition of the critical information exchanges which takes place between these two sections. However, at another location the Planning and Operations Sections operated from separate buildings, although most often the two sections operated from separate rooms. These configurations of the functional areas have implications for information flow within the Incident Management Team. Information silos can form by placing Sections and/or Units in separate rooms.

Guideline

- Proactively monitor the levels of communication occurring between rooms (Section and/or Units).
- Be open to rearranging the layout of the Incident Control Centre if the initial arrangement is shown to be inefficient.

- Place information showing the layout of the facilities and the locations of the AIIMS functional areas in a prominent position near the entrances to the Incident Control Centre.

If there are large open spaces where multiple sections and units will be operating then it is necessary to take into account the levels of environmental noise which may occur. The report suggests the following guideline to mitigate the effects of using a diverse configuration of facilities as Incident Control Centres.

Guideline

- If high noise levels appear to be a potential issue then consider using whiteboards, dividing and acoustic paneling and other similar technologies as sound absorbing and deflecting devices.

Role, Unit and Section identification

During the observations, researchers found variable levels of use of identifiers indicating the Incident Management Team role of the individuals and the Section or Unit in which they worked. The majority of personnel, other than the Section leaders (the Planning, Operations and Logistics Officer and the Incident Controller), were not wearing tabards or armbands that indicated their role or consequently the functional area in which they were working.

Role identifiers

It was observed that the Incident Management Teams did not have tabards or armbands necessary to fully identify all of the roles that all of the people participating were playing.

Guideline

- Ensure that the AIIMS based roles of all personnel can be clearly and unambiguously identified by wearing labeled and appropriately coloured tabards and/or armbands.

Section and/or Unit identifiers

It was observed that there were a variety of ways that Incident Management Teams identified the various functional areas. Some of these methods were clearer, and therefore preferable to others.

Guideline

- Ensure that all AIIMS based Sections and/or Units can be clearly and unambiguously identified.
- Useful organisational information (if available) should be displayed. (e.g. the AIIMS IMT organisational charts, role identifying charts, information flow maps)

Movement of people

It was observed that the positioning of furnishings and tools (such as, whiteboards, tables and desks) played a critical role in the where the personnel spent the majority of their time. Personnel congregated around desks and whiteboards which in some locations created issues associated with crowding in areas of the Incident Control Centre that obstructed access to other areas of the Incident Control Centre.

It was also observed that the common practice of displaying information on whiteboards and walls often had the unintended consequence of creating gatherings of people reading the information displayed that subsequently obstructed the movement of other personnel performing other tasks.

The report proposes three guidelines relating to the issue of facilitating the ability for people to move efficiently within the Incident Control Centre.

Guideline

- Pay attention to how the ability for people to move could be enhanced.
- Move tables, desks, whiteboards etc if they are obstructing the movement of people.
- Ensure that information is not displayed in areas where the movement of people will not be obstructed.

Fixed Technologies

It was observed that some technologies that are in fixed positions (such as radios, computers and fax machines) required that the Section and/or Units needing that equipment work in an area that may be inappropriate. For example, at one location the communications unit was positioned in a room where there was a fixed radio. This proved problematic because the room was also the only means by which the Incident Controller's room could be accessed. Given that the positions of fixed technologies in the Incident Control Centre facilities is beyond the responsibilities of the Incident Controller's responsibility to establish an Incident Control Centre as described in the AIIMS manual, the recommendations made in the report are restricted to the Incident Controller (or

others with responsibility) paying attention to the negative impact that they may be having on the ability of personnel to move about the Incident Control Centre efficiently.

Guideline

- Ensure that the positioning of fixed technologies are not adversely affecting the flow of information by inappropriately determining the location of Sections and/or Units.
- Consider the impact of fixed technologies on the movement of people.

Shared information display

It was observed that there are two broad categories of information displayed in such a way that multiple could share such information. The most common category of information displayed is 'operational' information; that is, information which relates directly to the specific circumstances of the bushfire to which they are responding. The second category of information is 'organisational' information.

Operational information

The vast majority of operational information displayed was displayed on whiteboards. In addition to the information written and drawn on the whiteboards, other printed information (such as maps) was often attached to the whiteboard and presented among the written and drawn information. It was observed that there was not a standard approach to the way that information was presented. The approach taken at each location was based on the locally developed inventiveness of the personnel involved. The report notes that the development of a means of learning from past experience and ensuring that successful solutions to problems encountered become part of the standard practice.

It was observed that often information that was placed on the whiteboards remained there for sometime. While this was appropriate for information such as contact details and management information (such as roles and meeting and briefing times etc.) other information relating to the fire situation are more time sensitive. The report suggests that time sensitive information displayed in such a way as to be seen over significant periods of time be clearly marked in terms of its currency by indicating so with a 'last updated' time indicator.

It was also found important that redundant and superfluous information be vetted and removed from open displays. In order that relevant information gets

the attention required it is important that it is not obscured by other less relevant and timely information.

Guideline

- Pay attention to how information is being presented in terms of clarity, accuracy and timeliness.
- Ensure that information displayed is always 'time-stamped' to indicate currency. For example, information on whiteboards should have 'last updated' information clearly shown.

Organisational information

The report notes that only one location had information displayed which related the organizational structure of the Incident Management Team and its relationship to the other levels of coordination and control. In addition to this information the same location displayed information that showed the identifying tabards and armbands associated with each of the roles, units and functions. It is understood that the provision of such information improves the likelihood that individuals will develop a deeper understanding of the interconnectedness of theirs and others roles.

Guideline

- Place in a prominent place, information concerning the AIIMS Incident Management Team structure.
- Place in a prominent place, information showing the information flow relationships between the Incident Control Centre and other coordination and control centres.

Whiteboards, projection screens and/or SMART Boards

Whiteboards were clearly the most prevalent method of presenting information at the Incident Control Centres where observations were conducted. As mentioned above, whiteboards also provided a platform upon which other materials could be displayed. It was observed that all Incident Management Team Sections used whiteboards extensively. On this basis the report suggests that those with responsibility for establishing an Incident Control Centre ensure that all Sections, and Units, have access to sufficient whiteboards.

It was also observed that whiteboards can also become an obstacle to the movement of people through the number of people that often gather in front of them and consequently the report suggests that those with the responsibility for

establishing an Incident Control Centre pay attention the positioning of whiteboards to avoid bottlenecks.

It was observed that the relatively new technology of *SMART Boards* was not used often, particularly by comparison to whiteboards. It was noted by some of the experienced Incident Management Team personnel (from whom the research team sought feedback concerning the guidelines being developed in this report) that *SMART Boards* provide the opportunity for information to be stored and retrieved later for any form of post event analysis. Consequently, the report recommends that the Incident Controller (or other with responsibility for establishing an Incident Control Centre, if available and practicable, give consideration to using SMART Boards instead of whiteboards.

Guideline

- Ensure that each Section and/or Unit has sufficient (at least one) whiteboards.
- Ensure that all whiteboards are fully equipped with multi-coloured markers (NB: Some colours do not readily photocopy- e.g. green).
- If available SMART Boards should be preferred to whiteboards as they provide a means by which information can be recorded and recalled. Ensure that recording and 'back-up' is done regularly.

Alternatives

The report notes that there was very few alternative methods employed to display shared information beyond those mentioned above. One location was however observed using a plastic 'cling-sheet' which provided a mobile and flexible surface that could cling to many vertical surfaces, such as walls, boards, doors and windows etc and written on with whiteboard markers. Consequently, the report suggests that consideration be given to obtaining this, or other similar products, if it assists in the clear, accurate and timely display of shared information.

Guideline

- Provide Sections and/or Units with alternative means of displaying information. For example:
    - 'write on cling sheets', a flexible plastic sheet which can be stuck on surfaces such as walls, boards, doors, windows etc. and written on with whiteboard markers.
    - Computers (laptops and/or desktop)
    - Data projectors
    - SMART Boards

It was apparent during the observations that there was not a standardised approach to many of the communicative practices of the Incident Management Teams. To facilitate information flow all Sections and/or units must have an agreed process and method for exchanging information. This involves both technological and human factors.

Guideline

- Ensure that all Sections and/or Units have appropriate communication processes and technologies.
- Ensure that Sections and/or Units have an appropriate means and method for displaying their specific information needs.

Lessons Learned

The final section of the report is concerned with the development of processes and procedures which would facilitate learning from experience. Although this issue is outside the scope of this report it was considered important to draw attention to the issue of learning. It was observed that local innovation and invention, based on the personal experiences of the IMT members, informed the approaches taken to Incident Management Team distribution and information management; particularly in terms of what information is represented, and how it is represented.

Guideline

- Ensure that all personnel have the means and opportunity to record both the problems identified and their solutions.

Further Comments

During the writing of this report comments and suggestions were sought from a number of people with experience working in an Incident Management Team. Many of the suggestions were slightly outside the scope of this report and concerned issues of process; such as, shift changes, briefings and meetings. These suggestions are also included in the report.

1 Introduction

The following report provides insights into, and analysis of, how the physical, technological and spatial characteristics of an Incident Control Centre impact on the flow of information within an Incident Management Team. This report also complements a related piece of work on enhancing incident management communication through enhanced teamwork performance which is reported in Deliverable 22.1.4 *A review of the strengths and weaknesses of observed IMT training with recommendations for improvement.*

One of the outcomes of the analysis reported here has been the development of guidelines to mitigate and manage any negative impacts that the building infrastructure and configuration may be having on an Incident Management Team. The guidelines proposed in this report are intended to assist those with responsibility for establishing and managing an Incident Control Centre.

1.1 Background

A number of inquiries, reviews and debriefs have identified that the facilities from which Incident Management Teams coordinate the response to bushfires, and other emergencies (see Comfort & Kapucu 2005, London Regional Resilience Forum 2006, Dawes, Cresswell & Cahan 2004), play a critical role in enabling or constraining the team in effectively performing their information and coordination roles (Ellis, Kanowski & Whelan 2004; Esplin, Gill & Enright 2003; Mcleod 2003). More recently, and as a consequence of the Black Saturday bushfires in Victoria on the 7th February 2009, the Teague Royal Commission (2009, p 22) has also made recommendations that the requirements for 'proper staffing and setup of pre-designated Incident Control Centres be made more explicit'. Recommendation 9.1 of the Teague Royal Commission Interim Report: Executive Summary (2009, 29) states:

> The state ensure that State Duty Officers of the CFA and DSE be given direct responsibility for ensuring pre-designated level 3 Incident Control Centres within their respective control are properly staffed and equipped to enable immediate operation in the case of a fire on high risk days.

As a consequence a greater level of attention is being paid to this area of bushfire response activity and this report is an example of that increasing recognition. There are some purpose built Incident Control Centres operating in Australia, however, none of these appear or are analysed in this study and report.

A key conceptual construct underpinning this research is that of the role of artefacts (tools, technologies etc.) in the work activity of Incident Management Teams as representing distributed cognition (see Hutchins 1995, Hollan,

Hutchins & Kirsh 2000). From this theoretical perspective the Incident Control Centre facilities themselves are artefacts. They comprise tools and technologies which should assist, not obstruct, the shared tasks of the Incident Management Team. In addition, and in the context of emergency response and management agencies having adopted the AIIMS model for incident management, the Incident Control Centre should also enable the facilitation of the AIIMS processes and expectations.

The facilities used for the Incident Management Team exercises, studied for this report, are the property of either land management agencies (for example, Parks and Wildlife in Tasmania and the Department of Sustainability and Environment in Victoria) or fire-response agencies (for example, the Tasmanian Fire Service in Tasmania and the Country Fire Authority in Victoria). The facilities which are the property of the land management agencies are ordinarily used for their everyday operational needs and are therefore primarily configured to be used as office space. The facilities that belong to the fire agencies are fire stations and are equipped with a variety of technologies which enable them to respond to fires. The majority of this work is however in response to Level One and Two fires and does not involve the presence of personnel from other agencies which occurs during a Level Three fire. The exercises observed for this report were all Level Three fire events. The use of such diverse facilities with such a diverse range of primary functions create their own difficulties, which will be discussed later in this report, has created many difficulties for the Incident Management Team's in achieving the AIIMS stated goal of providing clear, accurate and timely information.

Despite recent and increasing moves to standardise the processes and organisational structures and systems, with some exceptions (for example, Smith 2006, 2007), the issue of the facilities themselves has been largely overlooked. This report is not, however, intended to prescribe how such centres should be configured, but rather propose some guidelines that may be taken by those with responsibility when establishing an Incident Control Centre to assist the facilitation effective information flow, regardless of the facilities with which they are provided. It should be noted however that there are important indicators in this report of some of the factors that should be taken into account when designing buildings that will be used as Incident Control Centres.

For some time Australian emergency management agencies have been progressively adopting the Australasian Inter-service Incident Management System (AIIMS) approach to organising Incident Management Teams for responding to emergencies (see Appendix 1). AIIMS defines the functional areas and the roles of the personnel that work in them. It is therefore of critical importance that there is a high degree of compatibility between the configuration of the buildings and the functional needs of an AIIMS based organisational

arrangements. The flow of clear, accurate and timely information within an Incident Management Team will in part be reliant on the degree to which it is facilitated or hindered by the physical structures in which it takes place.

This report is informed with data collected by the Bushfire CRC D5 research team during thirteen observations of Incident Management Team training exercises held in eight different Incident Control Centres (for an outline of the methods used please see Appendix 2). Further information and findings based on the above Incident Management Team exercise research can be found in the September 2009 Fire Note (see Appendix 3).

The facilities used for these training exercises are the same facilities in which an Incident Management Team would typically operate during an actual bushfire response. In addition to the findings from the above research the report uses the AIIMS manual (2005) as a means of comparing the prescribed practice with the observed practice.

1.2 The observations

The number of Incident Management Team members should, according to the AIIMS (2005, 5), vary in accordance with the scale and complexity of the incident; based largely on the 'span of control' principle. The average number of people involved in the exercises was approximately 18 with the minimum being as few as 10 individuals in an Incident Management Team at Locations 4 and 6 and as many as 40 at Location 3 (For further information concerning the observations see Appendix 2). The explanations for why the numbers of Incident Management Team members varied are not important for this report. Nor is whether the number of people present was appropriate for the scale and complexity of the incident. This report is concerned with how those who did participate utilised the facilities and the other technologies provided.

The facilities described below are variously located in Victoria, New South Wales, Queensland and Tasmania. The diversity of facilities used also provided challenges for the research team. Often multiple rooms were used simultaneously and activity of interest occurred in many places where observers were unable to observe due to a lack of researchers. The advice below is therefore provided with the knowledge that the facilities available vary greatly in size, configuration and resource levels and is intended to serve as a guide based on generic issues which were identified in a number of Incident Control Centres and jurisdictions.

1.3 The AIIMS manual

The emergency management system used by the agencies participating in the exercises is the Australasian Inter-service Incident Management System (AIIMS). AIIMS defines the Incident Management Team functional areas, roles

and the organisational structure (see Appendix 1). The AIIMS manual (2005, pp 27, 35) identifies the Incident Controller as having the responsibility for the establishment a control facility. In addition to the responsibilities of the Incident Controller, in relation to the establishment of an Incident Control Centre, the AIIMS manual (2005, p 28) also specifies some other expectations in relation to the standards of information management within the Incident Management Team and consequently the Incident Control Centre. Information exchanged should be clear accurate and timely.

1.3.1 AIIMS and the Incident Control Centre

According to the AIIMS manual (2005, p 28) the Incident Controller has responsibility for the establishment of an Incident Control Point. In the initial stages of the response the Incident Control Point is 'normally' located near the incident. If the incident escalates in size and/or complexity it may become necessary for the Incident Control Point to be relocated to 'where more permanent and convenient facilities are available.' Once the Incident Control Point is established the relevant details and information should be 'communicated to participating and relevant personnel and authorities using the communications systems and procedures established to facilitate the functions of control' (AIIMS 2005, p 28).

The AIIMS manual (2005, p 28) describes the Incident Controller's role in establishing an appropriate management structure in the following terms:

> The Incident Controller establishes a management structure that is appropriate for the type, size and complexity of the incident. The structure may be simple or complex and encompass a number of participating organisations. A key attribute of an effective structure is that it can be expanded or contracted in response to changes during the incident.
>
> At an incident, it is important that:
>
> - Flow of information is clear, accurate and timely
> - Human, physical and fiscal resources and communication systems are identified, allocated and deployed
> - Accurate recording and reporting systems are in place.

All three points described in the AIIMS manual (see above) described as 'important' in the establishment of a 'management structure' are related to the issue of information management.

The concept of a 'management structure' encompasses the Incident Control Centre facilities and configuration but also includes the relationships between the Incident Control Centre and other levels and areas of control and coordination; such as, the sector/divisional command, regional levels of coordination and control (for example, MECCs, RECCs, DECCs and IFACCs used in Victoria) and the state-wide level of coordination and control (SCC also

used in Victoria). However, the establishment of the Incident Control Centre and the management of the Incident Management Team are also within the 'management structure' and as a consequence the above issues relate directly to the Incident Controller's responsibilities in establishing the Incident Control Centre facility. It is in this context that the issue of information flow in Incident Control Centres is discussed.

1.4 Outline of the report

The report:

- Uses observational research to identify how Incident Control Centres could be improved to assist the flow of clear, accurate and timely information.
- Uses the AIIMS defined goals as the basis for understanding whether the Incident Control Centre is facilitating or impeding the work of the Incident Management Team.
- Brings together the observations of both researchers and practitioners in order to suggest practical guidelines for the establishment of an Incident Control Centre.
- Identifies six interconnected and interrelated areas of Incident Control Centre and Incident Management Team facilitation that require attention.
- Provides visual examples of many of the areas and issues identified as important.
- Provides a series of guidelines designed to assist those with responsibility for establishing an Incident Control Centre.
- Provides the rationale for the development of a checklist of actions that can be taken by those responsible for the establishment of an Incident Control Centre.

The report identifies the following six areas which relate to the material configuration of the buildings utilized and the associated technologies associated with obstructing and/or hindering Incident Management Teams in their capacity to manage information in a clear, accurate and timely manner. The six areas identified are:

1. Building size and configuration
2. Role, Unit and Section identification
3. Movement of people

4. Fixed technologies
5. Shared information display
6. Lessons learned

2 Building size and configuration

In an ideal world the Incident Control Centre would have been constructed in such a way as to facilitate optimal levels of information flow and the space available would be viewed in terms of facilitating information flow. However, the use of space, the configuration of the floor plan and the positions of fixed technologies within the Incident Control Centre is largely determined by the available facilities.

The configuration of the Incident Control Centre facilities used in the observed Incident Management Team exercises varied greatly. There is a relationship between the organisational structures and functional roles defined by AIIMS and the positions in which they were placed within the Incident Control Centre. For example, the majority of the Incident Management Teams made use of a relatively large central room where the Operation Section was placed and Incident Management Teams also placed the Planning Section nearby, often in the same room.

The configuration of the buildings and the positions of fixed technologies and designated rooms constrained and shaped the relational spatial positioning of the AIIMS based Incident Management Team functional areas. Figure 1 (below) shows how two buildings, and four rooms, were used by the Incident Management Team at Location 1. One building with three rooms was used by the Incident Management Team at Location 2 and one room with three rooms was used by the Incident Management Team at Location 3. Figure 1 (below) shows how two buildings, and four rooms, were used by the Incident Management Team at Location 1. One building with three rooms was used by the Incident Management Team at Location 2 and one room with three rooms was used by the Incident Management Team at Location 3.

Figure 1(below) shows two views of Location1's building configuration and floor plan. The view on the left shows the two buildings in relation to each other. The Figures on the right show an expanded view of the rooms, the locations of AIIMS Incident Management Team functional areas and the positions of the various technologies that were used. The shaded areas of the floor plan Figures in Figure 1(below) are approximate representations of where the Incident Management Team work activity took place within the Incident Control Centre[1].

At Location 1, for example, the Incident Controller for a variety of reasons (e.g. no alternative, to have a quiet, area for briefings and meetings) decided it was

[1] These Figures were drawn during the research observation by the report author based on his view of the activity as it occurred.

necessary to work in a separate building to the Planning, Operations and Logistics Sections (see Figure 1 below). Logistics were themselves isolated in a small room (in the same building as Planning and Operations) for which access was difficult. Later during the same exercise the Planning Section also moved into another building (the same building as the Incident Controller) because of the noise levels in the largest room where the Operations Section was positioned. However, at Location 1(discussed above) it was observed that by placing the Planning and Operations Sections in two buildings, separated by an approximately 20 metre long covered walkway (see Figure 1 below), attempts to achieve efficient and timely communication between the Incident Management Team functional areas were often frustrated. Some expressions of this frustration were heard by observers with some personnel describing it as 'chaotic'.

At the Location 2 (see Figure 2 below) exercise, the exercise facilitators were occupying a room which would have normally been used by the Incident Controller (room 4). As a consequence the Incident Controller used the remaining small room (Room 3) where access could only be gained via the Operations/Communications room (Room 2) for briefings and meetings. This arrangement lead to bottle necks where it was very difficult for personnel to enter, leave or pass through the Operations/Communications room and provided the Operations and Communications personnel with many unnecessary distractions which hindered them in the performance of their work.

The observations also noted different configurations and use of Operations and Planning rooms which are outlined in Table 1.

Table 1: The relative placement of the Planning and Operations Sections at the 8 locations.

Location	The relative locations of the Planning and Operations Sections		
	Same room	Different Rooms	Different Buildings
1	-	-	✓
2	-	✓	-
3	✓	-	-
4	-	✓	-
5	✓	-	-
6	✓	-	-
7	-	✓ (adjoining glass wall)	-
8	-	✓	-

As the observation methodology developed, so too did our capacity to represent, and analyse Incident Control Centres and the room movement and associated activity of selected roles. The Figures 4-8 showing Locations 4-8 provide a schematic representation. The Figures representing Locations 4-8 are derived from the measurements of the facilities spatial dimensions taken during the

observations. Figure 4 also shows where the observational target was in the room and for how long they were there was obtained from video footage taken during the observations. It is a more detailed representation of work activity than that represented in Figures 1, 2 and 3. Similar data has also been collected for Locations 5, 6, 7 and 8 so that room movement figures can also be generated for those locations. This Figure is at present for illustrative purposes only.

The figures in Figures 4-8 (below) show the floor plans for the Operations Rooms at Locations 4, 5, 6, 7 and 8 respectively. The figure for Location 4 also shows where the Planning and Operations Officers spent their time while in the Operations Room for the period of the sampled observation. The figure also shows that the Planning Officer (represented by the yellow coloured block[2]) was only present in the Operations Room briefly (D7- the size of the block indicates a proportion of the exercise sample time). At Locations 3 and 6 where Operations and Planning Officers worked in the same room Operations and Planning personnel were observed spending a greater amount of time in each others respective areas than those locations where the Planning and Operations Sections were positioned in different rooms (Locations 1,2,4,7 and 8), and in the case of Location 1 different buildings as well. Another configuration that seemed to work well was where the Planning and Operations Sections were in adjoining rooms separated by a glass wall. This allowed for some shared situational awareness about the level of activity in each section.

[2] In grey scale (if printed in black and white) the yellow blocks are discernibly lighter in shade than the red blocks.

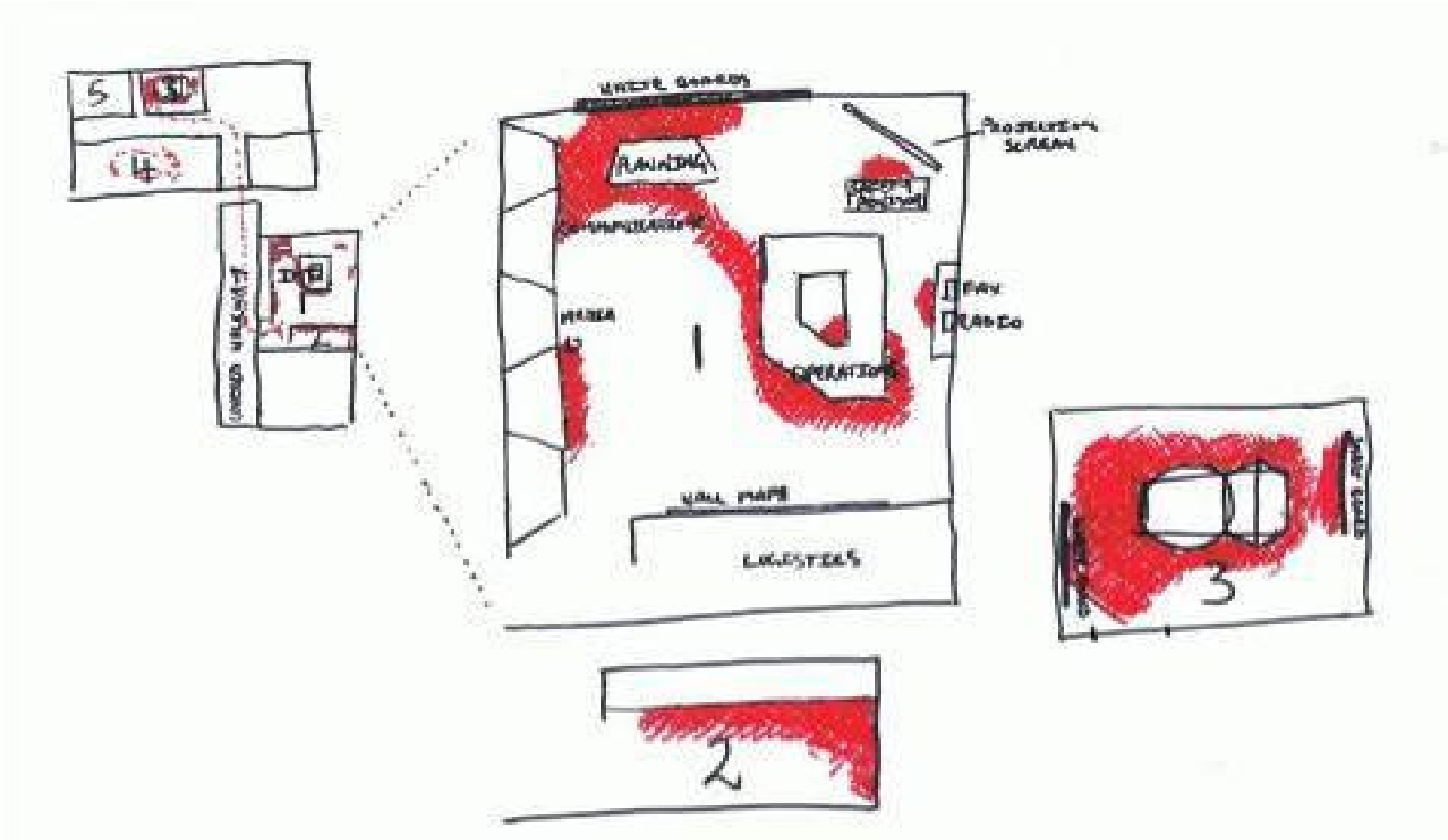


Figure 1: The floor plan, configuration and room movement at Location 1.

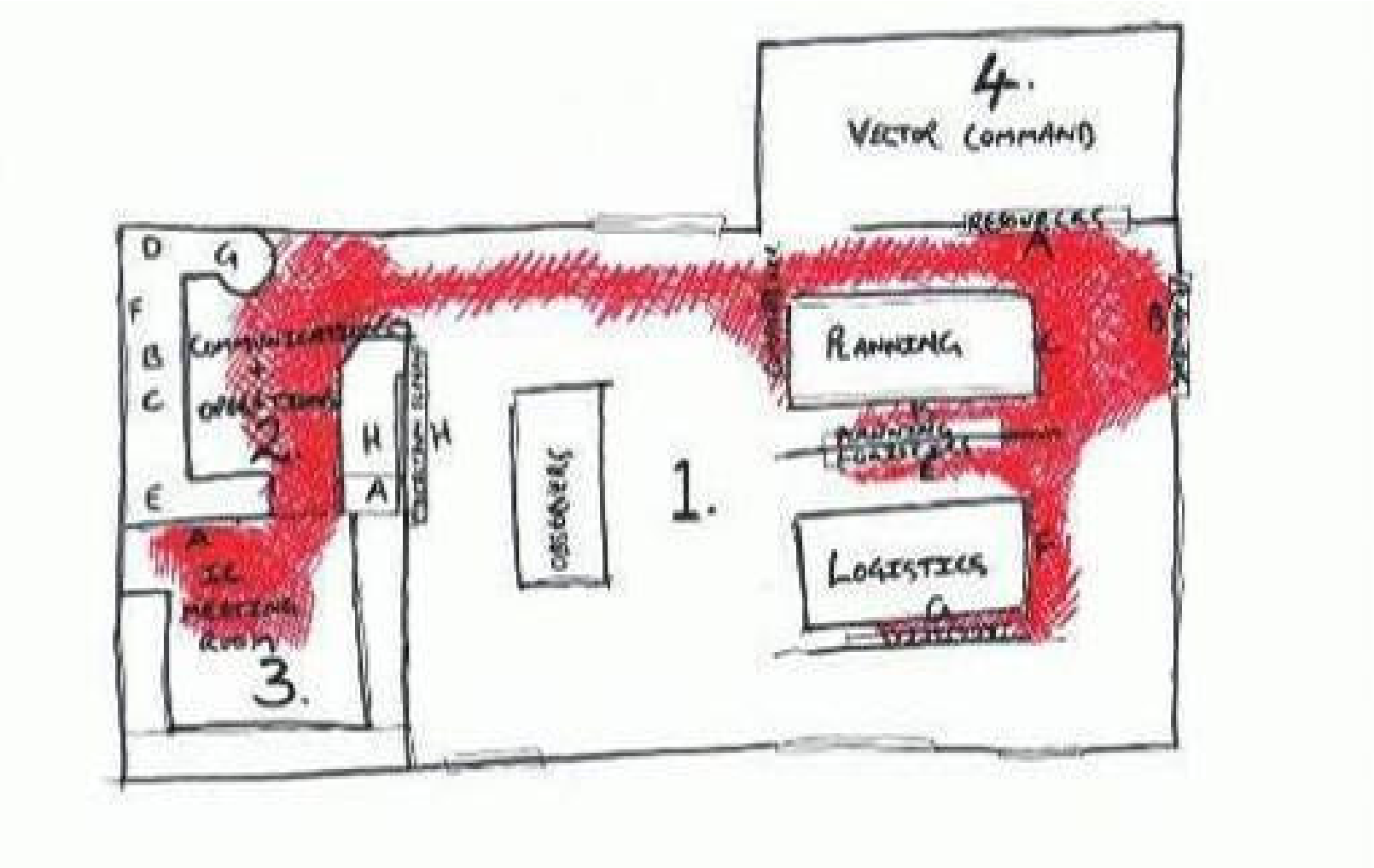


Figure 2: The floor plan, configuration and room movement at Location 2.

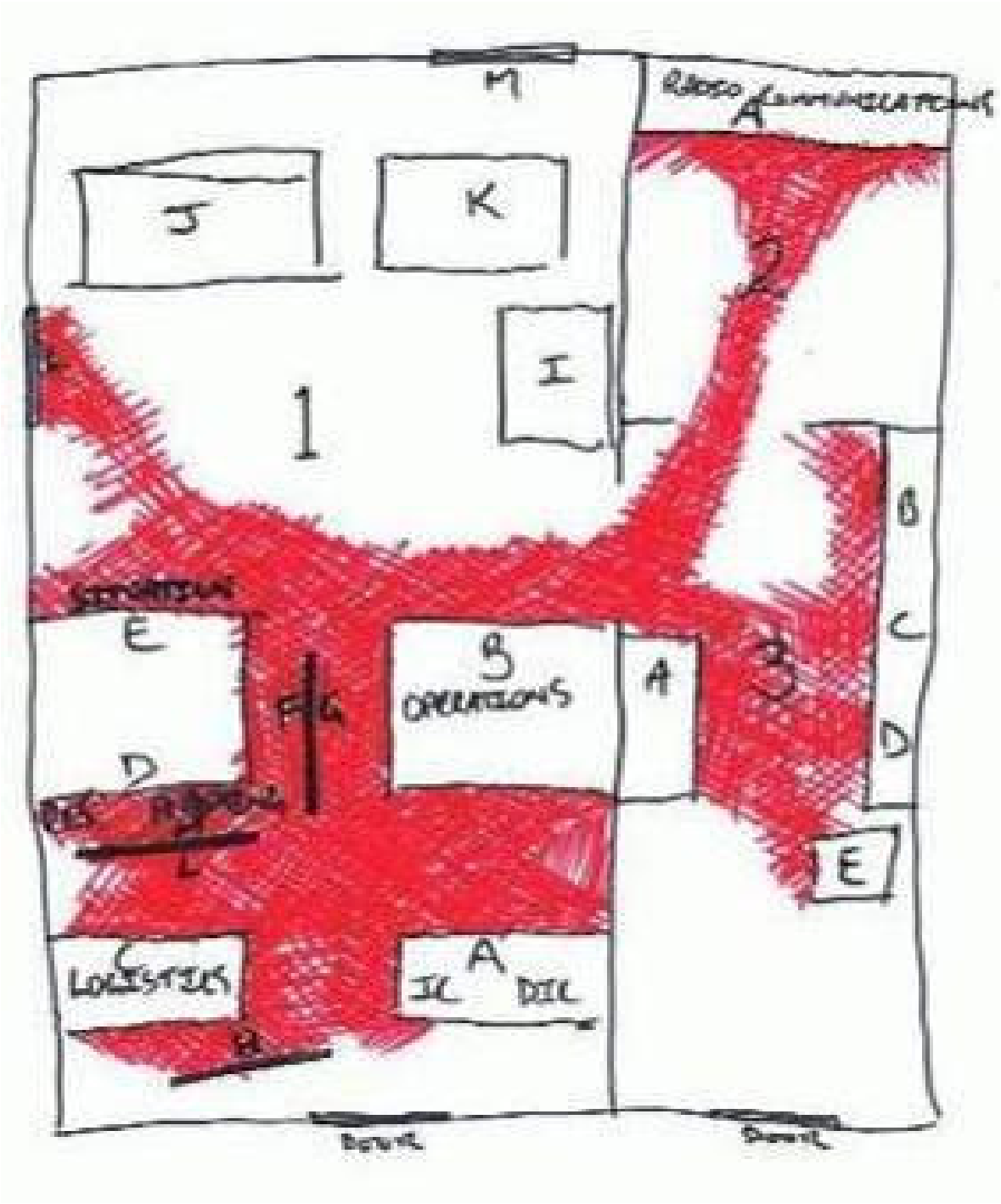


Figure 3: The floor plan, configuration and room movement at Location 3.

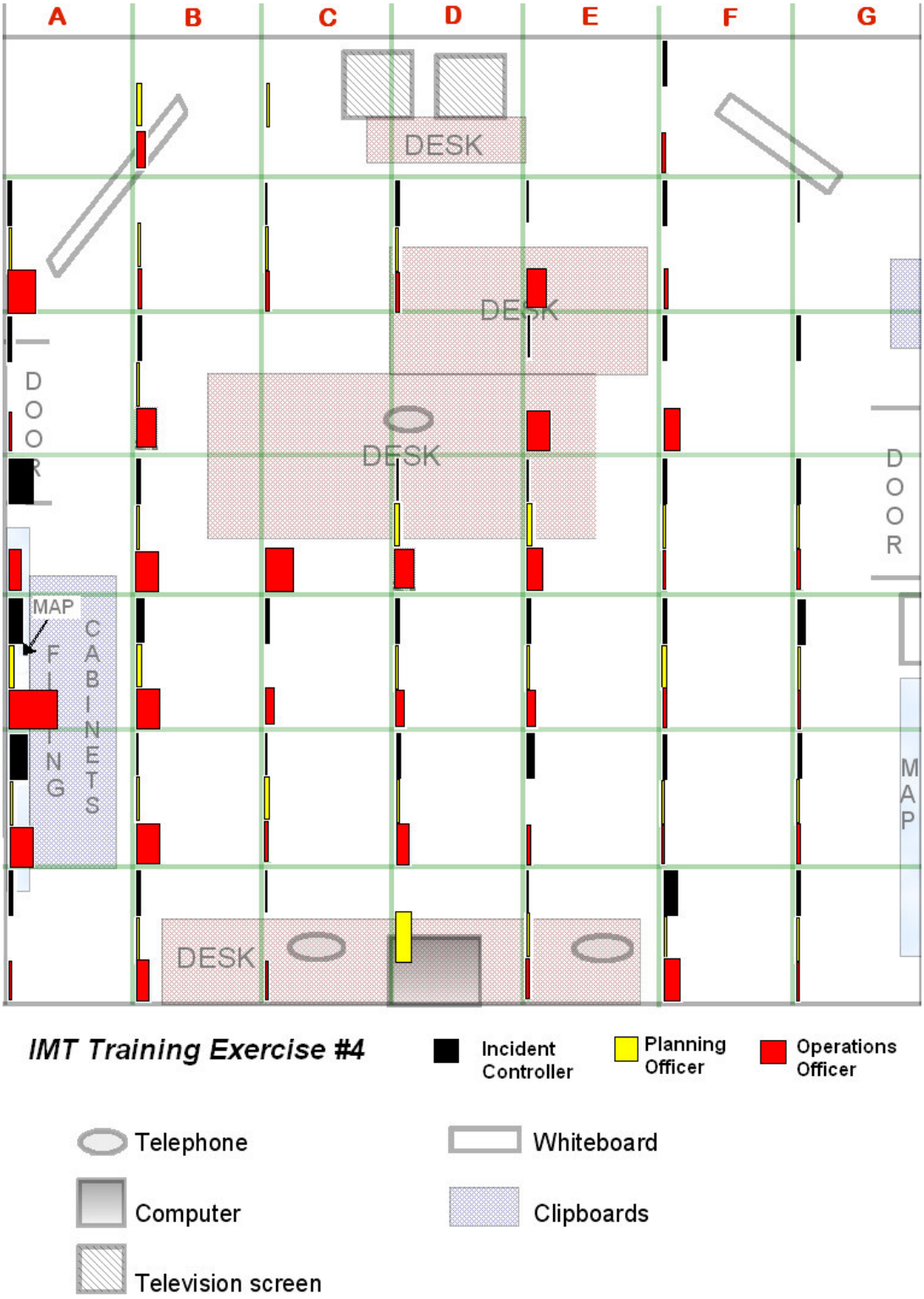


Figure 4: The floor plan, configuration and room movement at Location 4.

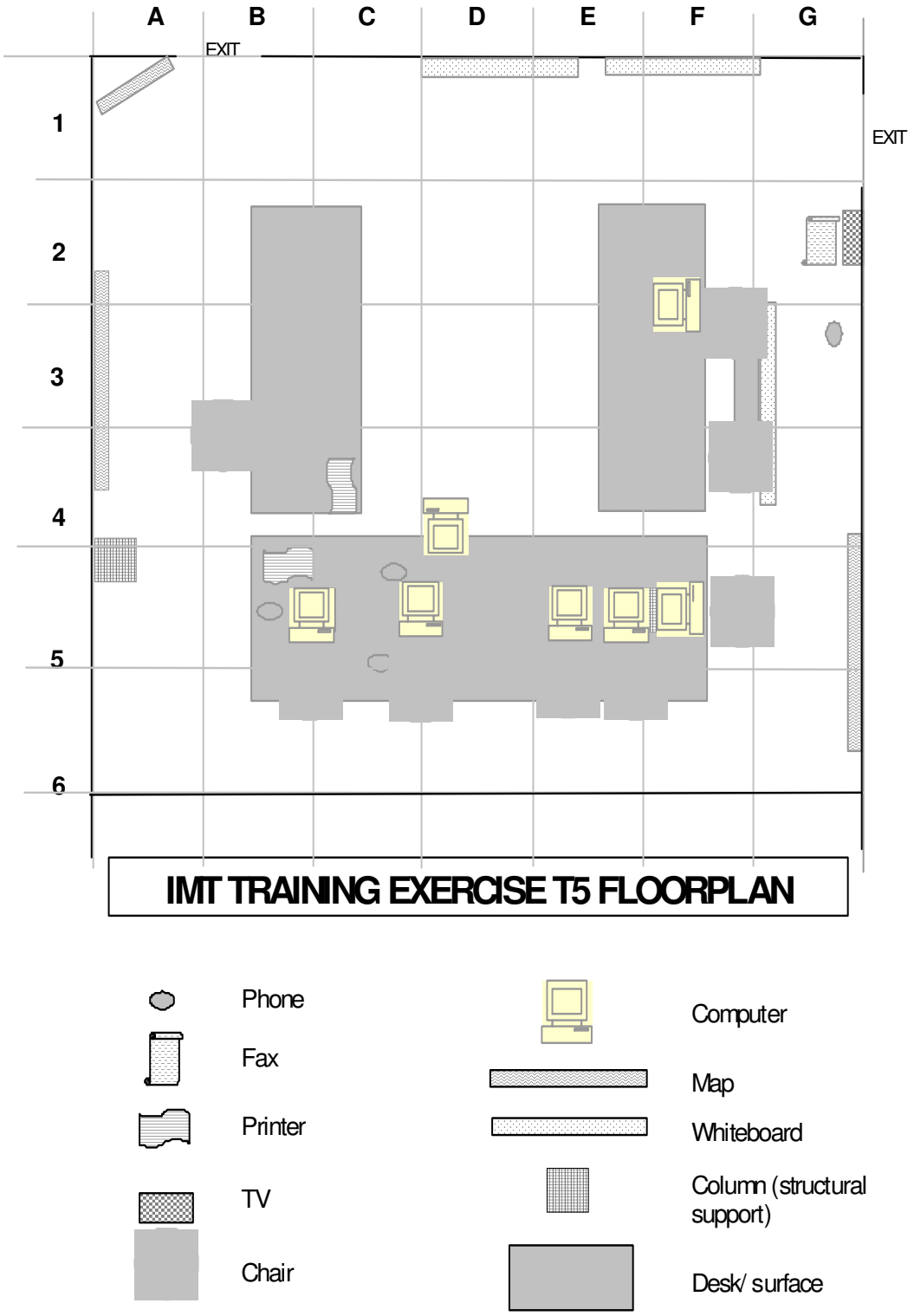


Figure 5: The floor plan and configuration at Location 5.

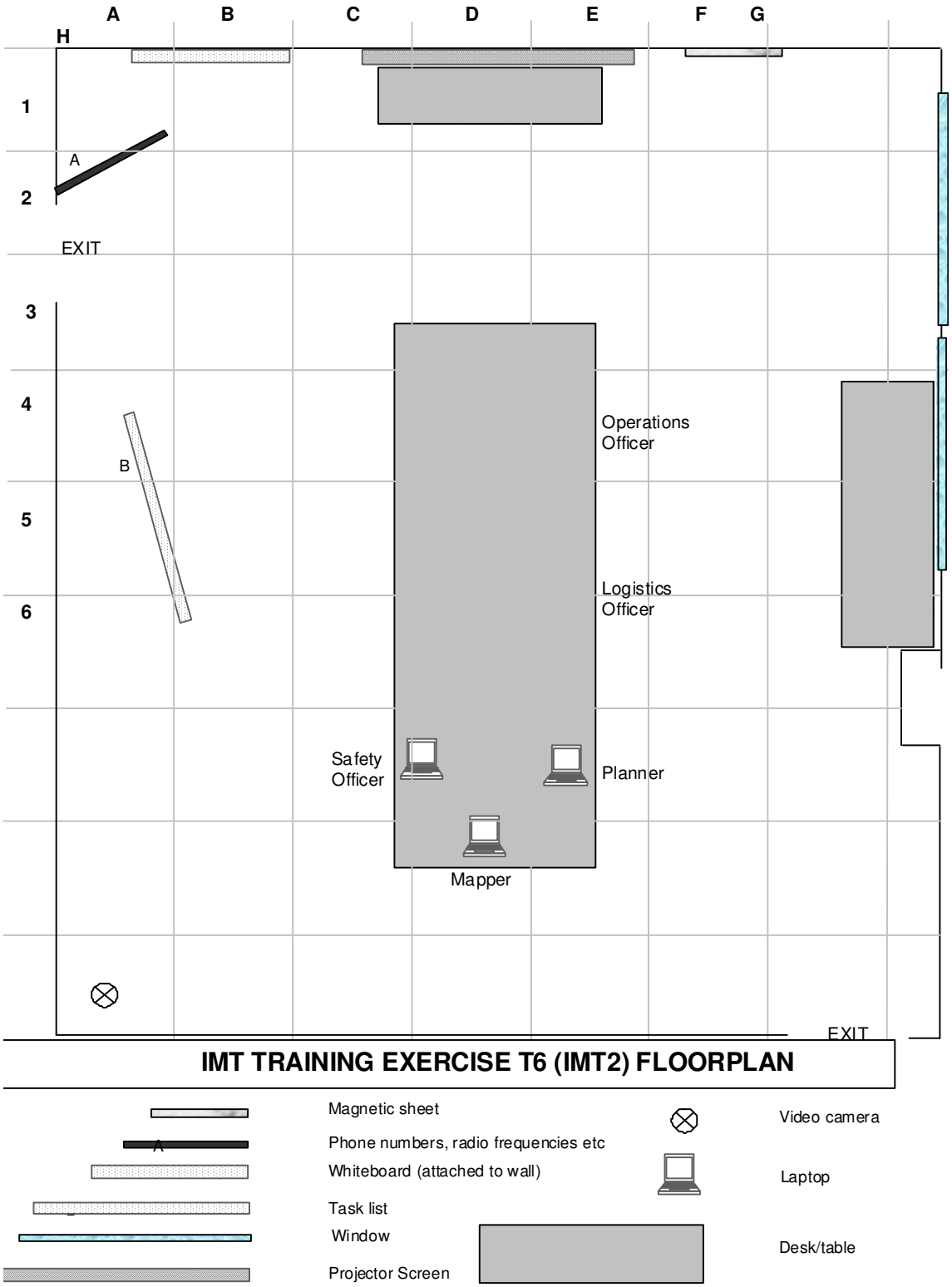


Figure 6: The floor plan and configuration at Location 6.

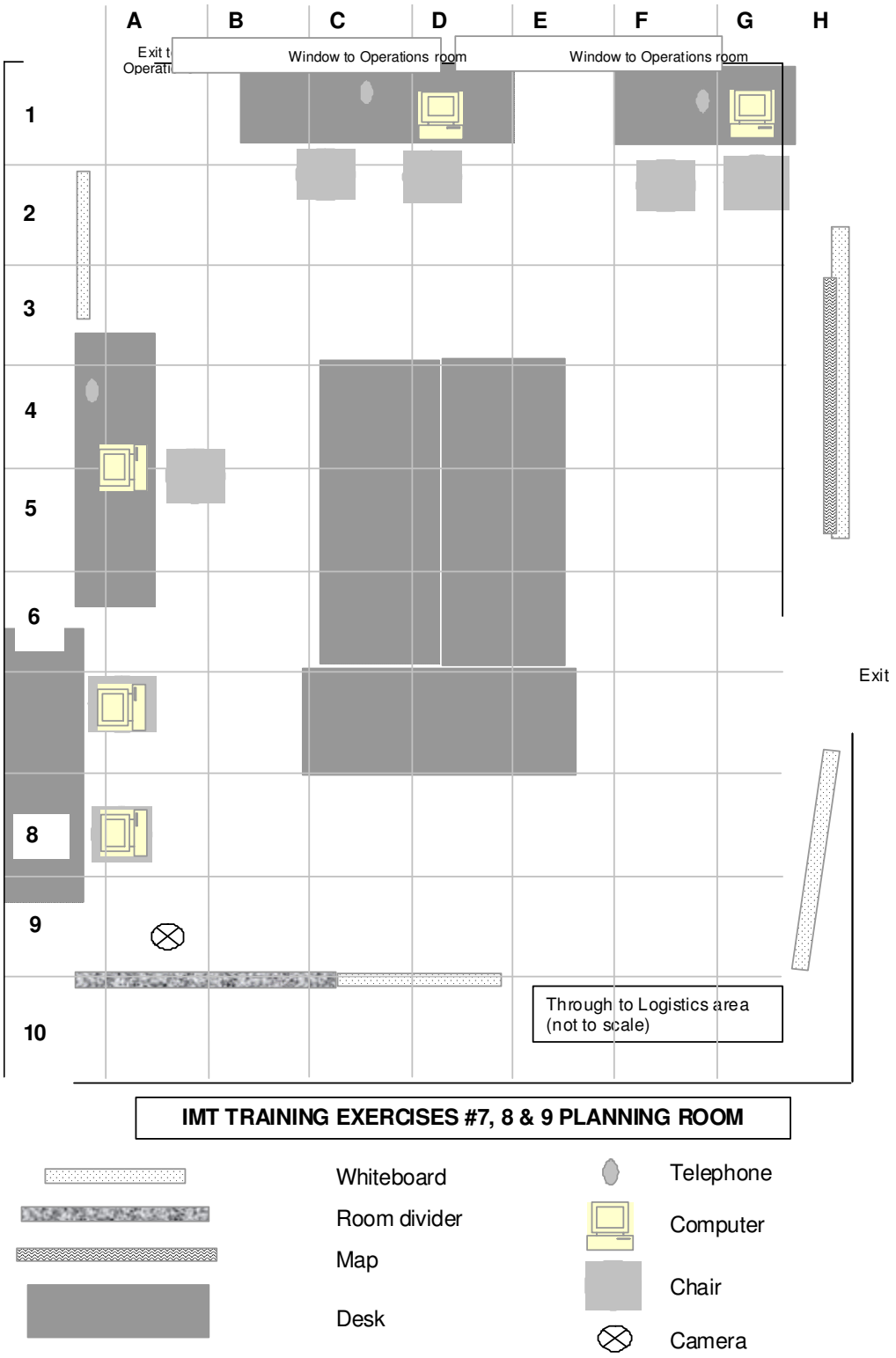
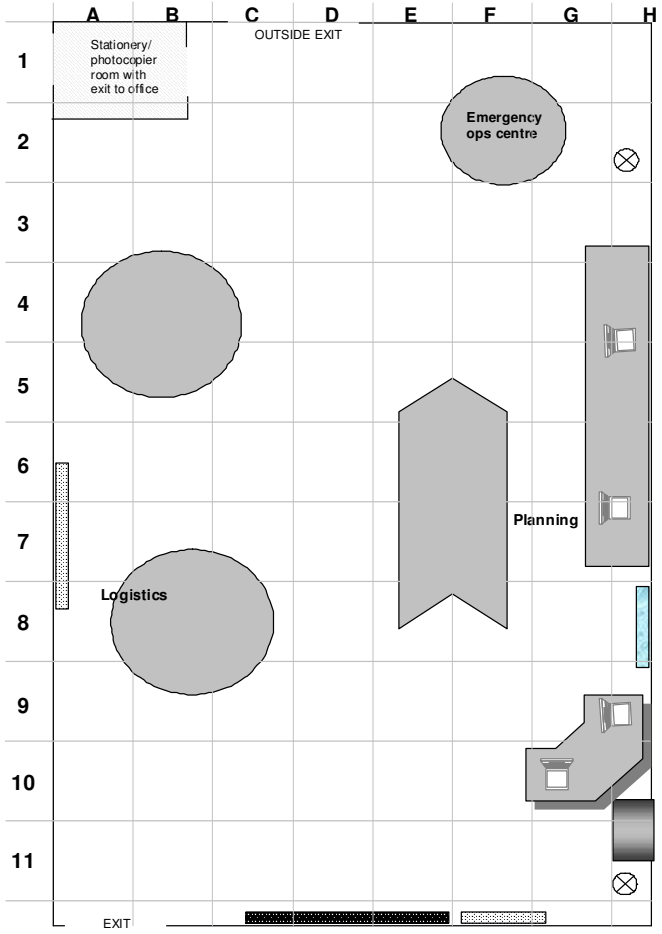


Figure 7: The floor plan and configuration at Location 7.

The Planning and Logistics Room at Location 8



The Operations Room at Location 8

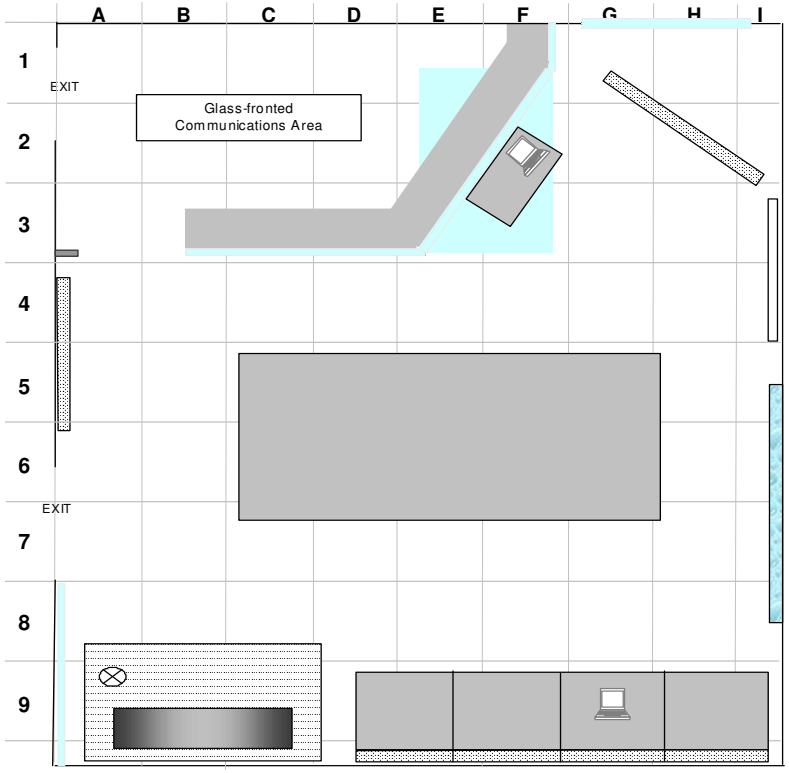


Figure 8: The floor plan and configuration at Location 8.

If there are multiple rooms be aware that information silos can form by placing Sections and/or Units in separate rooms.

Guideline

- Proactively monitor the levels of communication occurring between rooms (Section and/or Units).
- Be open to rearranging the layout of the Incident Control Centre if the initial arrangement is shown to be inefficient.
- Place information showing the layout of the facilities and the locations of the AIIMS functional areas in a prominent position near the entrances to the Incident Control Centre.

2.1 Floor size

It was observed that in addition to a room being too small it was also possible for a room to be too big. As discussed, there appeared to be a temptation to place Sections in the same room if the room was large enough. However, one unintended negative consequence of doing so was the creation of high levels of environmental noise, distraction, crowding and bottlenecks. At Location 1 and 4 (Figure 1 and

Figure 4 respectively), for example, the Operations and Planning Sections were established in the same room. It became apparent after approximately 45 minutes, at both exercises, that the noise from the two sections was making it difficult for personnel to focus on their own tasks. As a consequence the Planning Section moved into another building at Location 1 and into another room at Location 4. At other locations both sections were able to operate from the same room; at Location 3 this was done where whiteboards (Figure 3: “F/G” in Room 1) were used as partitions dividing the sections (and possibly acting as sound barriers). It was also observed at Location 3 that the Incident Controller’s mentor recommended to him that he move from the Operations Section (in Room 1) and position himself in the adjacent room (Room 3) in order to not be distracted by the operational factors and needs and focus more on the management of the team.

It can be seen in Figures 1-4 that there was a large amount of activity in specific areas of the Incident Control Centre and that there were other areas of the Incident Control Centre where little or no activity took place at all. At Location 2 (see Figure 2) for example, the Incident Controller may have instead chosen to

have his briefings and meetings in Room 1 in the unused space and thus alleviating the bottleneck in the Operation Section. At Location 3 (see Figure 3) the Planning and Operations Sections could have instead been arranged in such a way as to make use of the area of Room 1 (that is, where the desks “I”, ”J” and “K” were positioned) and thus alleviate some of the crowding and bottlenecks which developed around the whiteboards partitioning Planning and Operations.

If there are large open spaces where multiple sections and units will be operating then it is necessary to take into account the levels of environmental noise which may occur.

Guideline

- If high noise levels appear to be a potential issue then consider using whiteboards, dividing and acoustic paneling and other similar technologies as sound absorbing and deflecting devices.

2.2 Role, unit and section identification

At many locations the head of each section (i.e. the Planning, Operations and Logistics Officers) wore tabards indicating the section within which they were working. However, it was observed that the use of appropriate identification for roles, units and sections was variable across the eight locations where observations occurred (see Figure 9 below). At most locations the majority of people present in the Incident Control Centre were not wearing anything which indicated their role in the Incident Management Team or the functional unit to which they belonged. This practice is contrary to that advocated by the AIIMS. The AIIMS manual (2005, p 28) states that:

> The wearing of tabards by **all** members of the Incident Management Team and other officers in the structure is important for the effective identification of key personnel at the incident (my emphasis).

Figure 9: Five people without section, unit or role identification.

The Incident Management Team at Location 8 wore a mixture of tabards and armbands which indicated the role that they were performing (Figure 10 below). Locations 7 and 8 were the only locations where role identifying armbands were used. It was also observed that Location 8 was the only location where organisational information was displayed and some of this information related directly to role and function identification (see Figure 11 below).

Figure 10: Armbands used for identifying roles and functions.

In addition to displaying operational information the facilities at Location 8 displayed organisational information which related to the management processes and structures being employed by the team. For example, here were two colour laminated charts on a wall in the Incident Control Centre that showed the colours and patterns of the tabards for all of the IMT roles and the organisational structures and functions that they represent (see Figure 11 below).

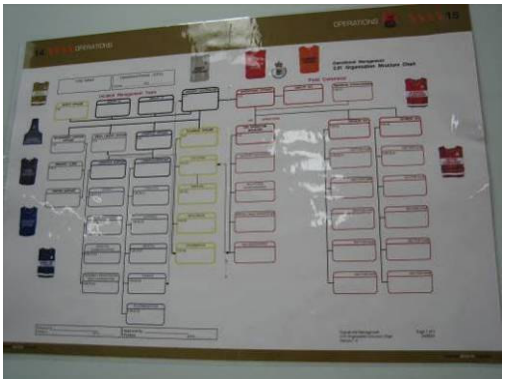


Figure 11: Charts identifying the IMT organisational structure roles and functions.

To facilitate information flow all AIIMS based roles should be clearly identifiable

Role identifiers

Guideline

- Ensure that the AIIMS based roles of all personnel can be clearly and unambiguously identified by wearing labeled and appropriately coloured tabards and/or armbands.

It was also observed that the use of appropriate and clearly visible identification for sections and units was also varied in its application. At Location 3 the ceiling had pre-positioned labels indicating where each section within the Incident Control Centre was positioned (see

Figure 12 below). While these prepositioned ceiling labels provided a means by which the AIIMS functional areas could be identified it could also have the unintended consequence of predetermining the positions of those areas. On the other hand, if the Sections are prepositioned based on evidence supporting the predetermined arrangement rather than other peripheral considerations, such an approach could be adopted more widely.

Figure 12: Two methods for identifying the IMT Section.

At other locations, such as Location 1 and 2, the sections were positioned in accordance with the perceived needs of Incident Management Team at the time of the exercise within the limitations of the Incident Control Centre facilities. Other than the predominance of a colour in some areas, in terms of tabards- where these were worn, there was no other indication of the AIIMS based functional area.

To facilitate information flow all AIIMS based sections and units should be clearly identifiable.

Section and/or Unit identifiers

Guideline

- Ensure that all AIIMS based Sections and/or Units can be clearly and unambiguously identified.
- Useful organisational information (if available) should be displayed. (e.g. the AIIMS IMT organisational charts, role identifying charts, information flow maps)

3 Movement of people

The configuration of the buildings, in terms of the number of rooms used, room sizes and the relative location of the rooms varied greatly across the eight locations. The different Incident Management Team sizes provided an opportunity to observe how Incident Management Teams might operate at various levels of incident scale and complexity. It also demonstrated that the configuration of an Incident Control Centre is not a static event and that during different phases of the Incident Management Team's existence different configurations will be more suitable than others. As the size of the Incident Management Team increases, or decreases, their interaction with the Incident Control Centre configuration will change. Preferably, the Incident Control Centre should be adaptable and able to be configured to fit the needs of the Incident Management Team and not the other way around.

Some of the decisions about the location of AIIMS based functions were decided by the fixed nature of some technologies. The most obvious example of this was the location of the radio communications technology which predetermined the location of the Communications Unit (within the Operations Section). In addition to the information flow problems which may result from the remoteness of the fixed radio station, at Location 2, the fixed position of the radios in a small room, that became the thoroughfare connecting the operations room and the meeting room, resulted in the communications room becoming congested and overcrowded (see Fixed Technologies below).

Figure 13: Congested access to and from a briefing and meeting room.

Whiteboards being used as both Section partitions and display tools sometimes also had the unintended consequence of creating bottlenecks and obstacles to the movement of personnel within the Incident Control Centre. The positioning of the whiteboards ("F"/"G" and "M"/"L") at Location 3 (see Figure 12 below)

caused considerable crowding which made entering and leaving Room 1 difficult. Figure 14 (below) shows a photograph which captures the crowding which occurred around the whiteboard between the Planning and Operations Section.

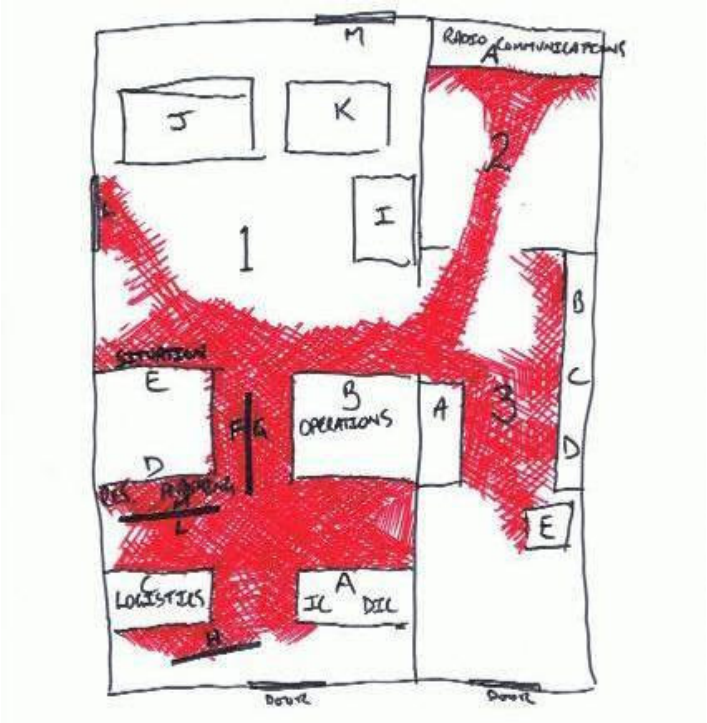


Figure 14: Activity levels and crowding that can occur around whiteboards.

The shaded areas in the floor plan figure show that a lot of activity occurred in the area of the whiteboard (Room 1: F/G). This area was also a thoroughfare for

Incident Management Team members moving about the Incident Control Centre. The door at the bottom of Room 1 was the only exit directly from the Operations Room to the rest of the building (including the exit).

Bottlenecks and obstructions

Guideline

- Pay attention to how the ability for people to move could be enhanced.
- Move tables, desks, whiteboards etc if they are obstructing the movement of people.
- Ensure that information is not displayed in areas where the movement of people will not be obstructed.

4 Fixed technologies

The observations showed that the pre-positioning of artefacts played a critical role in the way that the Incident Management Team operated in the Incident Control Centre. This was particularly evident in terms of communications. At a number of locations the radio communications personnel were positioned in places determined by the fixed nature of the radio hardware.

In addition to the floor-plan the positioning of artefacts provided another means by which activity was influenced by the physical, structural and spatial dimensions of the Incident Control Centre. The positioning of radios for example predetermined where the Communication function was positioned relative to other functions.

Figure 15: Fixed communications technologies.

It was observed that frequently in the Incident Control Centres that the radio technology, and consequently the Communications Unit, was relatively remote from the rest of the Incident Management Team. Advice received during the feedback phase of this research advised that this can be done as a means of avoiding the general noise of the radio communications but also so as to avoid distracting Incident Management Team members with the content of the radio communications. The isolation, however, can have negative consequences, particularly when inexperienced radio operators are engaged. In the observations it was noted that frequently the first breakdown of information flow occurred with information not successfully getting out of the Communications Unit and into the rest of the Operations Section. Some case examples illustrate this point.

Although no direct observations were made concerning the positioning of fixed internet portals it is not difficult to imagine that some of the issues relating to other fixed communications technologies may also apply.

At Location 2 the Incident Management Team, for example, positioned the Communications Unit and the rest of the Operations Section in the same room (where the fixed radios were located) and worked from the same desk. Location 1, on the other hand, enlisted a person, with little (if any) experience, to operate the radio on her own, and in relative isolation from the other functions. She conveyed messages that she received to Operations personally. Given her self-expressed lack of confidence when given the role it seemed that such a critical role in terms of information flow should not have been given to someone with such little experience. Though the choice to have the Communications function isolated from the other functions was not solely due to spatial and layout constraints the original position of the radio did mean that spatial integration of Communications with the other functions would be problematic.

At Location 2, the radio room was positioned in such a way as to obstruct the flow of people into the Incident Controller's meeting and briefing room. As pointed out above this was due to the exceptional circumstances provided by the presence of the exercise facilitators. It does, however, demonstrate how permanently fixed artefacts can necessitate particular spatial-organisational arrangements which are not conducive to efficient and effective activity.

During another Incident Management Team observation, in another state jurisdiction, during a real time event the radio room was isolated in a room on its own. To gain access to the room it was necessary to leave the building and gain access through the area where fire-plant, such as trucks, was kept on standby. The radio operator was a relatively young woman on secondment from elsewhere within the fire response agencies. She told a researcher that she had very little experience and during the day she received and sent only a couple of messages. In the Incident Control Centre itself the Incident Controller and other personnel appeared to be using mobile phones to communicate with various personnel at the fire-ground.

Many Incident Control Centres are equipped with fixed technologies such as radios, telephones, computers and fax machines. These are often positioned in accordance with their primary use which may not be that of an Incident Control Centre. It is therefore necessary that when establishing the Incident Control Centre the positioning of such equipment does not determine the overall configurations are of the Incident Control Centre and the Incident Management Team. The sections should be positioned in relation to each other according to the information management needs of the sections and units within the context of the Incident Management Team. The report suggests that those with

responsibility for the establishment and maintenance of an Incident Control Centre should take a proactive role in organising the facilities available in such a way that the movement of people can occur efficiently, and that technologies such as radios be contained to avoid noise distracting others, but not so remote so as to become isolated. It is also suggested that particular attention be paid to the role of radio communications as a critical component in information flow.

Prepositioning of technology determining Incident Management Team Section and/or Unit positioning

Guideline

- Ensure that the positioning of fixed technologies are not adversely affecting the flow of information by inappropriately determining the location of Sections and/or Units.

- Consider the impact of fixed technologies on the movement of people.

5 Shared information display

Shared information display is critical in the development of shared understanding and facilitating the flow of accurate and timely information within an Incident Control Centre. There are a number of options available; each better suited to a specific purpose than the others. Technologies available include:

- Whiteboards
- Projection screens and SMART Boards
- Paper (normal and 'cling sheets')

The shared information displayed at the various Incident Control Centres was presented in a variety of ways. Table 2 (below) shows the different shared information technologies used at each of the eight locations where observations occurred. All Incident Control Centres were equipped with whiteboards and maps and they were used by all of the observed Incident Management Teams. *SMART Boards* were not available at all of the locations while at other locations they were available but not used.

Table 2: The use of shared information technologies according to location.

Location	Whiteboards	Wall maps	*SMART Boards*	Data Projectors	Cling Sheets
1	✓	✓	✓	-	NA
2	✓	✓	NA	-	NA
3	✓	✓	NA	✓	NA
4	✓	✓	?	✓	NA
5	✓	✓	?		NA
6	✓	✓	-	-	✓
7	✓	✓	?		NA
8	✓	✓	?	✓	NA

✓ = Used ✗ = Not Used NA = Not Available

The most common way for this type of information to be presented was by the positioning of maps on whiteboards and then using the surface of the whiteboard adjacent to the maps for the recording of relevant information. Many maps, however, appeared to also be 'displayed' while still on desks.

Information Presentation

Guideline

- Pay attention to how information is being presented in terms of clarity, accuracy and timeliness.
- Ensure that information displayed is always 'time-stamped' to indicate currency. For example, information on whiteboards should have 'last updated' information clearly shown.

5.1 Two types of shared information displayed

It was observed that the vast majority of the information displayed in a way that enabled it to be seen by most, if not all, Incident Management Team members was operational in character. Operational information is information that is generated from the fire event and response and includes situational, resource and weather information. The facilities at Location 8 also had organisational information on display. There were four laminated colour posters which related to the organisational structures and processes which would assist the Incident Management Team personnel develop an understanding of where they fit in the broader scheme and effective management practice (see Figure 14 below).

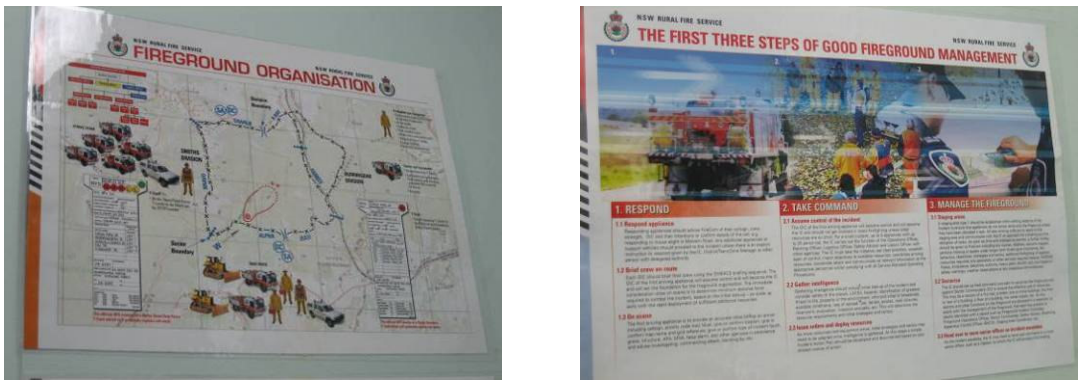


Figure 16: Posters showing the organisational structures and practice.

Organisational information

Guideline

- Place in a prominent place, information concerning the AIIMS Incident Management Team structure.
- Place in a prominent place, information showing the information flow relationships between the Incident Control Centre and other coordination and control centres.
- Clearly display key meeting and reporting times

5.2 Whiteboards

It was observed that frequently information that was placed on the whiteboards remained there for some time. While this was appropriate for information such as contact details and management information (such as roles and meeting and briefing times etc.) other information relating to the fire situation are more time sensitive. The report suggests that displays of time sensitive information be clearly marked in terms of its currency by indicating so with a 'last updated' date/time indicator.

It was also found important that redundant and superfluous information be vetted and removed from open displays. In order that relevant information gets the attention required it is important that it is not obscured by other less relevant information.

5.3 Conveying information and Section partitions

Whiteboards were used at all locations to varying degrees. At all locations whiteboards were used for displaying information, by having information written directly on the surface or by providing a platform on which printed paper-based information could be displayed. The Incident Management Teams at Location 2 and 3 while also using the whiteboards for the purpose of information display also used whiteboards as a way of partitioning and demarcating the AIIMS based functional sectors.

At Location 3 the Incident Management Team used whiteboards as partitions. It was observed that the whiteboards, in addition to serving the dual purpose of being an information platform and partition, also served the purpose of absorbing and deflecting environmental noise emanating from elsewhere in the Incident Control Centre.

Operations view **Planning view**

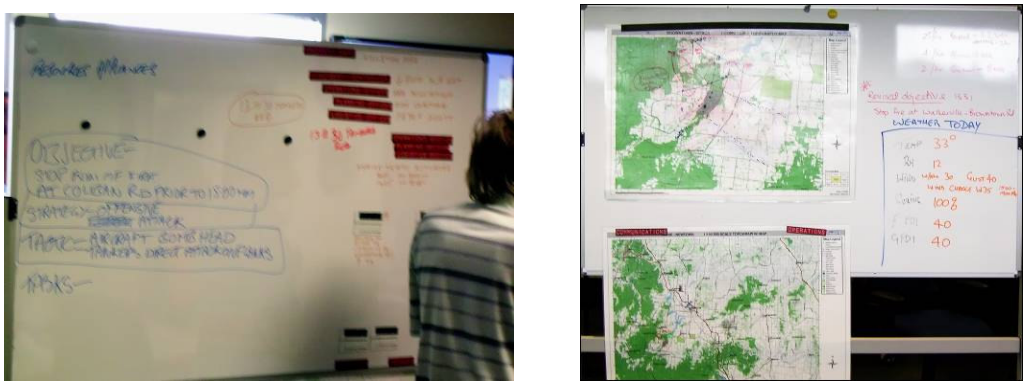


Figure 17: The high level of activity around the whiteboards at Location 3.

The Incident Management Team at Location 2 also used whiteboards (E/D; the line between Planning and Logistics) to divide two Sections (Planning and Logistics). The level of activity surrounding these whiteboards was not as high as that observed at Location 3.

Planning view **Logistics view**

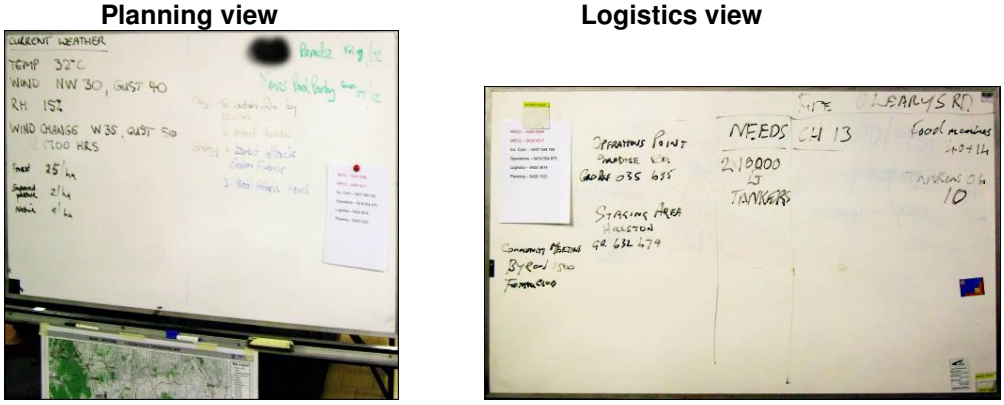


Figure 18: Two views of the whiteboards (Location 2) partitioning two sections.

Whiteboards were used extensively, and for a variety of purposes, by most Sections in the majority of Incident Control Centres where observations were conducted. For example, Figure 21 shows the whiteboards in the Operations Section (at Location 4 (A2-B1and F1-G1) by contrast were hardly used at all with the majority of the activity taking place at a central desk (3B-3E and 4B-4E) and at another desk and map (A5-A6). Whiteboards, in addition to providing a surface for writing information on, also provided a means by which paper based information, such as maps, could be hung and displayed.

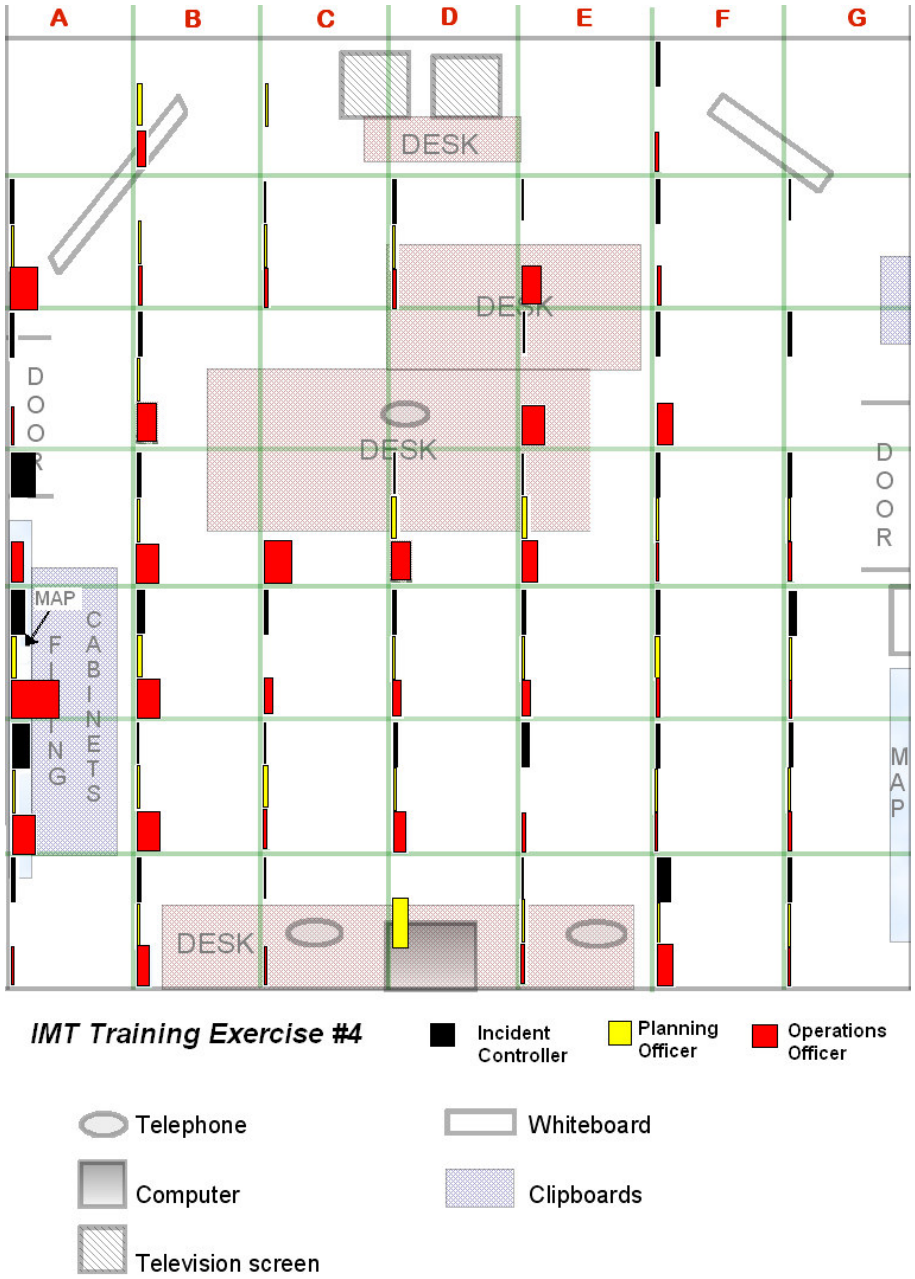


Figure 19: The low level of activity that occurred around whiteboards (Location 4).

The use of whiteboards at Location 4 (see Figure 15: B1- A2 and F1- G1) contrasted with the use of whiteboards at Location 3 (see Figure 20: D4-D6) indicates that they were used very differently in the two exercises. Figure 20 (below) shows that at Location 3, where both the Planning and Operations Sections operated from the same room that there was more opportunities for spontaneous exchanges of information (indicated by the extensive number of blocks where two roles were in discussion) and the development of a shared situational awareness.

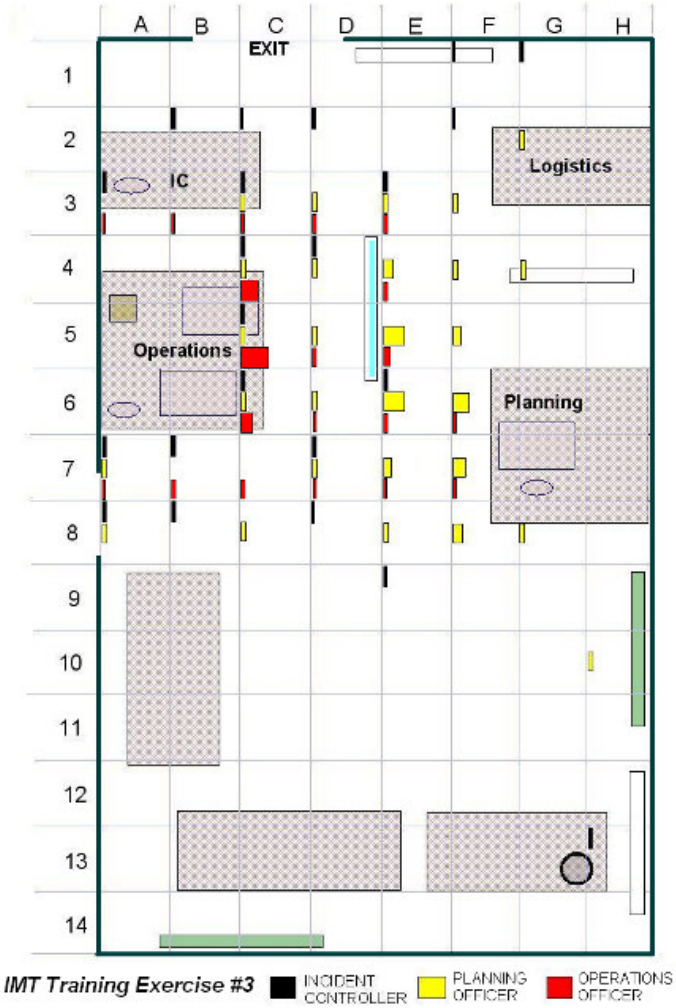


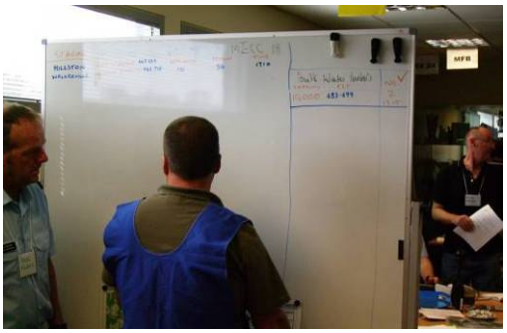
Figure 20: High levels of activity around the whiteboards (Location 3) partitioning two sections.

Figure 20 (Location3) does not show the work activity of the Logistics Officer during the sampled observation period[3]. The photograph below (Figure 21) however, shows that the Logistics Section also made extensive use of two whiteboards (Figure 20: 1D – 1F) to record and convey a lot of detailed information concerning resource needs and allocation.

It should be noted that Location 3 was the highest performing team on many of the teamwork performance indices (see XXXXXXX).

[3] Because the focus of the research, in this observation, was on the roles of Incident Controller, Planning and Operations Officers and the activity of the Logistics Officers were not coded.

Whiteboard 4-F, G, H **Whiteboard 1-D, E, F**



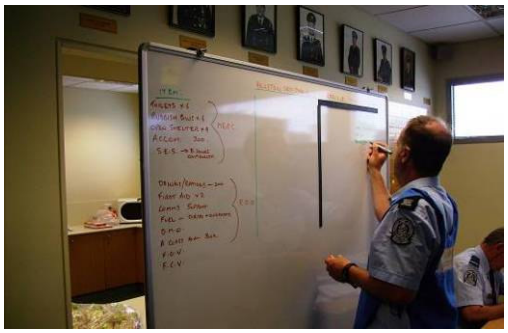


Figure 21: Whiteboards showing the resource allocations and needs at Location 3.

The detail of the information and the way in which it was represented varied across all locations, and there did not appear to be a standard approach to how such information could be best represented. A diversity of approaches to the task of representing operational 'resource' information was also observed across all observations, and appeared to be the product of local invention based on the experiences, skills and imagination of those confronted with the task. It is recommended (later) in this report that a means by which solutions to problems and proven practice can become a standard by which others can learn in the future and this is an example of where such an approach may prove useful.

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Figure 22: The whiteboard showing the resource allocations and needs at Location 2.

General

Guideline

- Ensure that Sections and/or Units have an appropriate means and method for displaying their specific information needs.
- Ensure that all Sections and/or Units have appropriate communication processes and technologies; e.g. 'in' and 'out' trays, designated liaison officers etc.

5.4 Smart Boards TM and projection screens

Some of the Incident Control Centres were equipped with *SMART Boards* and projection screens. *SMART Boards* and projection screens are relatively new technologies and have only recently been adopted in Incident Control Centres. Some *SMART Boards* resemble whiteboards and can be written on in a similar way using coloured markers. The advantage *SMART Boards* have over whiteboards is that the information can be recorded for later analysis and printed for broader distribution. Although many of the Incident Control Centres were equipped with *SMART Boards* only one Incident Management Team was observed (Location 6) using the printing and recording functions[4].

Planning Section at Location 1 (Room 3)

Planning Section at Location 2 (Room 1)

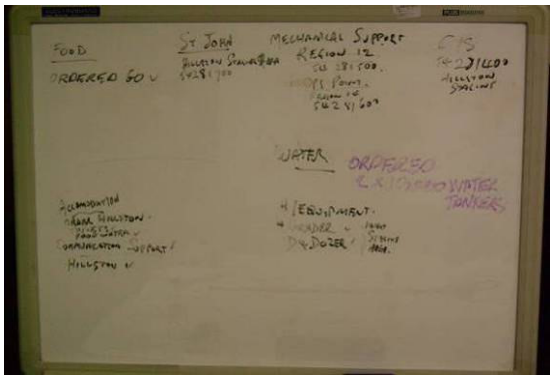


Figure 23: *SMART Boards* being used in the Planning Sections of Location 1 and 2.

It is also interesting to note in Figure 23 that the *SMART Board* is being used for an unintended purpose (displaying a paper-based map), which in so doing, diminished the opportunity to use the full coverage available on the board and to print all of the information displayed for later record management purposes.

[4] It may have occurred but was not observed

Whiteboards, projection screens and/or *SMART Boards*

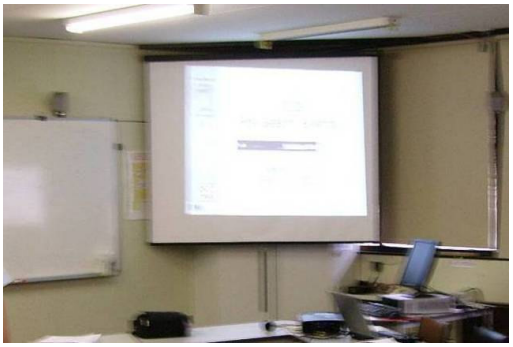
RECOMMENDATION

- Ensure that each Section and/or Unit has sufficient (at least one) whiteboards.
- Ensure that all whiteboards are fully equipped with multi-coloured markers (NB: Some colours do not readily photocopy- e.g. green)
- If available *SMART Boards* should be preferred to whiteboards as they provide a means by which information can be recorded and recalled. Ensure that recording and 'back-up' is done regularly.

5.5 Projection screens

Another technology which is being considered in this section of the report is the projection screen. Many Incident Control Centres had projection screens and used them for displaying a variety of information types. At Location 1 before and at the beginning of the exercise, and for some part thereof, the projection screen (see Figure 1) displayed some OH&S information. However, it was not used for the purpose of conveying operational information during the exercise.

Location 1 **Location 2**



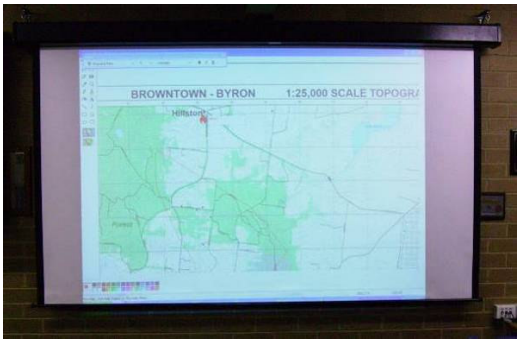
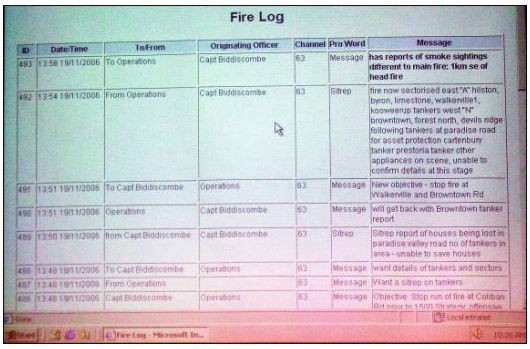


Figure 24: The projection screens at Location 1 and 2.

At Location 2 a map of the region in which the fire was located was displayed on the projection screen (Figure 2: Room1, A) but did not show any real-time representing the fire's progress or shape. The map projected on the screen was observed to not receive much attention during the exercise. Given that it did not show any of the relevant fire situation data this was not surprising. These types of visual displays could be used more effectively for enhancing shared representation and awareness.

At Location 3 there were two projection screens available. One displayed the Fire Log (see Figure 25 below) (resource requests etc.) while the other displayed a map with the fire 'shape' indicated. It appeared however that there were some IT issues which made the process slow and labour intensive. The IT problems with electronic displays and their updating was also observed in real-time fires. It appeared that as a consequence of a time lag between the actual fire ground situation information being received and the computerised representation of the same projected on the screen in the Incident Control Centre that the information displayed was not as current as required. The data from the observation indicated that there was only minimal use of these technologies at Location 3 (see Figure 3).

Projection Screen (B & C- 14)



Fire Log

ID	Date/Time	To/From	Originating Officer	Channel	Pro Word	Message
493	13:58 19/11/2006	To Operations	Capt Biddiscombe	63	Message	has reports of smoke sightings different to main fire: 1km se of head fire
492	13:54 19/11/2006	From Operations	Capt Biddiscombe	63	Sitrep	fire now sectorised east "A" hilston, byron, limestone, walkenville1, kooweerup tankers west "N" browntown, forest north, devils ridge following tankers at paradise road for asset protection cartenbury tanker prestoria tanker other appliances on scene, unable to confirm details at this stage
491	13:51 19/11/2006	To Capt Biddiscombe	Operations	63	Message	New objective - stop fire at Walkenville and Browntown Rd
490	13:51 19/11/2006	Operations	Capt Biddiscombe	63	Message	will get back with Browntown tanker report
489	13:50 19/11/2006	from Capt Biddiscombe	Capt Biddiscombe	63	Sitrep	Sitrep report of houses being lost in paradise valley road no of tankers in area - unable to save houses
488	13:48 19/11/2006	To Capt Biddiscombe	Operations	63	Message	want details of tankers and sectors
487	13:48 19/11/2006	From Operations		63	Message	Want a sitrep on tankers
486	13:48 19/11/2006	Capt Biddiscombe	Operations	63	Message	Objective: Stop run of fire at Colliban Rd prior to 1600. Strategy: offensive

Projection Screen (H- 9, 10 & 11)

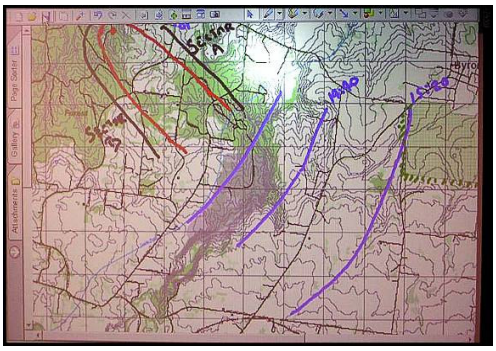


Figure 25: The projection screens at Location 3.

While these displays have potential, they were not used extensively. The only person who was observed to look at the projection screen (see Figure 25: B & C- 14) the Planning Officer who stood in front of it for less than 5 minutes (see Figure 20). The other screen showing the Fire Log (see Figure 25: H- 9, 10 &11) did not appear to play a significant role in the way that the Incident Management Team performed their work as very few personnel were observed giving it any attention, referring instead to their paper-based copies.

5.6 Maps

Displayed horizontally on desks and tables

Maps were displayed in a variety of ways. The most common of way of displaying maps was to lay the maps on desks and tables. Interested personnel would then stand around the desk upon which the map was placed. Placing the maps on desks and tables was observed to be problematic for two reasons. The first of these reasons was that the interested parties were forced to cluster into tight groups to facilitate viewing the maps. Because the maps were on desks, at approximately the waste height of those standing and viewing the maps, only

those in the front position were able to get a clear view. As those in the front moved away or aside others were able to access and see the maps. During the discussions of the fire situation involving maps on tables those without a clear view were not able to view the map. The second issue relates to the positioning of the interested parties in relation to the map's orientation.

Figure 26: Personnel reading a map from (at least) two directions.

At Location 1 the arrangement of desks in the Operations Section (see Figure 1) into a 'ring' required some personnel to crawl under the desks to get to the inner boundary of the 'circle' in order to view the map which was placed on a desk (see Figure 26 above). In addition to the difficulties caused by the need to crawl under the tables it also resulted in some of the personnel having a view of the map from the opposite orientation adding to the difficulty for the personnel involved in reading the maps. The Operations Section at Location 1 did not use any whiteboards during the exercise. These may have provided a means by which the maps could be displayed vertically, as done at the majority of other locations.

Displayed vertically on walls and whiteboards

Maps displayed vertically on walls and whiteboards, like those displayed on desks, were also problematic due to the crowding of interested parties. The figures showing the use of floor space by personnel shows that the Incident Management Team personnel being observed spend a large proportion of their time in front of maps hung vertically. Time spent in front of maps, both vertically and horizontally displayed combined, accounts for a large proportion of the observed time.

Figure 27: An Incident Controller straining to see a map displayed on a whiteboard.

At some locations the whiteboards were fixed to the wall (for example Location 1, Room 1 and Location 2, Room 3) and the sections using those whiteboards positioned themselves in relation to them.

5.7 Paper (standard and 'cling sheets')

The use of paper forms of information management and display was the most prevalent of all types of information display media. Maps, schedules, resource allocation, contact details, situation reports and Incident Action Plans etc were all recorded and displayed to varying degrees on paper. Much of the information flow within an Incident Control Centre is not 'shared' in the sense of being displayed for general viewing in the way that a map, or a schedule of briefing times may be, but is instead recorded discretely in computer files, log books, diaries, emails, faxes etc. It was observed that all Incident Management Teams were equipped with the preprinted documentation required for the flow of information. The exercises at Location 1, 2 and 3 were provided with the necessary items by the exercise facilitators. It was not clear whether or not the Incident Control Centre was already equipped with all of the same items (see Figure 28 below).

Location 1

Location 2

Location 3

Location 8

Figure 28: The Incident Management Team 'kits'.

Information displayed on paper was usually attached to a whiteboard although walls and doors were also used. Paper based displays in these circumstances were usually attached to the surface with 'sticky tape' or *blu tack*. At Location 6, however, the Incident Control Centre was equipped with a product known as 'write on cling sheets', a flexible plastic sheet, which provided a surface like a whiteboard to write on that could be stuck on almost any vertical surface. This technology allowed for a greater level of flexibility in the way that the Incident Management Team was able to position their selves because it provided a flexible means of displaying shared information.

Alternatives

RECOMMENDATION

- Provide Sections and/or Units with alternative means of displaying information. For example:
  - 'write on cling sheets', a flexible plastic sheet which can be stuck on surfaces such as walls, boards, doors, windows etc. and written on with whiteboard markers.
  - Computers (laptops and/or desktop)
  - Data projectors
  - SMART Boards

6 Communication

It was apparent during the observations that there was not a standardised approach to many of the communicative practices of the Incident Management Teams. A discussion and analysis of the communicative practice involved in supporting teamwork and coordination has been provided in a separate report (see D5 Deliverable 22.1.4 – *Review of IMT Training*).

To facilitate information flow all Sections and/or units must have an agreed process and method for exchanging information. This involves both technological and human factors.

Information Exchange

RECOMMENDATION

- Ensure that all Sections and/or Units have appropriate communication processes and technologies.
- Ensure that Sections and/or Units have an appropriate means and method for displaying their specific information needs.

7 Lessons learned

It was observed that each Incident Management Team used locally evolved practices and approaches to the management of information. The way in which each Incident Management Team chose to represent the available information varied greatly across the eight Incident Control Centres where observations occurred. Though not being in an appropriate position to make evaluations and judgments about which practices were the best and/or worst it did appear that there were some locally evolved practices and solutions which should be disseminated and propagated more broadly. These practices could then be adopted elsewhere if they were determined to be both applicable and beneficial.

So that solutions to problems identified during the life-time of the Incident Control Centre and Incident Management Team can be implemented in the future, opportunities for personnel to record 'lessons learned' should be provided and encouraged.

There are a number of technologies available which could assist the Incident Management Team in passing on locally developed solutions and approaches so that others could learn from their experience. For example, it was observed that information, such as resource allocation and requests, was represented differently at all locations. Given that exercises at Location 1, 2 and 3 were all based on the same scenario it was interesting that the way in which information was represented varied greatly. Which of these approaches best represented the information is beyond the scope of this report. It is not unreasonable, however, to assume that some of the approaches taken would produce better outcomes.

The lack of knowledge transference and learning between different Incident Management Teams is an area of incident management requiring further attention. There needs to be a process by which innovative solutions to problems can be adopted as standard practice.

Feedback

RECOMMENDATION

- Ensure that all personnel have the means and opportunity to record both problems identified and their solutions.

8 Final Comments

During the writing of this report comments and suggestions were sought from a number of people with experience working in an Incident Management Team. Many of the suggestions were slightly outside the scope of this report and concerned issues of process; such as, shift changes, briefings and meetings. However, due to the interrelatedness between the various dimensions of Incident Management Team work within an Incident Control Centre it was thought that the suggestions made should be included in the final report. The following are some of those suggestions received:

- Where possible identify and use a specific room for meetings with controlled access.
- Always consider a redundancy option no matter what level of technology you have available.
- Consider the location of radio communications- do not allow it to distract the Incident Management Team.
- Capturing and recording information and decisions, ensuring that everyone has input, and that the meeting is held in suitable surrounds/environment.
- Give attention to the communicative practices between the Incident Management Team (in the Incident Control Centre) and other stakeholders. For example, communication between the Incident Controller and the Information Unit and/or communication between the Incident Controller and external levels of coordination such as the Municipal Emergency Coordination Centres (MECC)/Regional Emergency Coordination Centres (RECC) and state-wide level of coordination and control (ECC).

9 Conclusion

The report identified six areas of Incident Control Centre configuration where issues require further attention if enhancements in information flow and communication are to be made. The report makes a number of suggestions as to how the issues identified may be mitigated and managed. The report is focused on providing practical advice that can be used by those responsible for establishing and maintaining an Incident Control Centre. It is reasonable to expect that facilities that are purposefully designed and constructed to be used as Incident Control Centres may perform the role better than facilities with multiple uses and roles. However, not all the facilities that are required to be used as Incident Control Centres are purpose built. The issues highlighted, and suggested guidelines, do however give a strong indication of many of the factors which should be taken into account if facilities are to be constructed in terms of enhancing information flow within an Incident Control Centre.

During the observation phase of this research it was noted that the facilities currently in use are diverse in their scale, configurations and levels of resources. The way in which Incident Management Teams used the diverse facilities and the technologies to manage information also showed considerable variation. The way in which Incident Management Teams chose to represent shared information was both enabled and constrained by the choices available.

Incident Management Teams are required to remain flexible in their abilities to adapt to the conditions in which they are required to operate. However, at the same time Incident Management Teams are required to change and adapt those same conditions to suit their needs. This report provides both, a distillation of the problematic issues confronting an Incident Management Team in the facilities in which they currently work, and suggested guidelines to assist those with responsibility for establishing and maintaining an Incident Control Centre.

The suggested guidelines are included in this report (see Table 3) and also attached within this package in the form of a checklist. It is hoped that such a checklist will be useful to those responsible for establishing and maintaining an Incident Control Centre so that they can systematically ensure that all possible steps had been taken to optimise information flow within the facilities in which they are required to work.

The findings presented in this report provide a basis, and a foundation on which to build more consistent performance in centres that are configured to enhance, rather than hinder, communication.

Table 3: The guideline checklist.

Concern			Status	
Area	**Issue**	**Recommendation**	**Done**	**Attention Required**
Building size and configuration	Rooms and information silos	Proactively monitor the levels of communication occurring between rooms (Section and/or Units).		
		Be open to rearranging the layout of the Incident Control Centre if the initial arrangement is shown to be inefficient.		
		Place information showing the layout of the facilities and the locations of the AIIMS functional areas in a prominent position near the ICC main, and other entrances.		
	Environmental noise	If high noise levels appear to be a potential issue then consider using whiteboards and other similar technologies as sound absorbing and deflecting devices.		
Role, unit and section identification	Role identifiers	Ensure that the AIIMS based roles of all personnel can be clearly identified by wearing labeled and appropriately coloured tabards and or armbands.		
	Section and/or Unit identifiers	Ensure that all AIIMS based Sections and/or Units can be clearly identified.		
		Useful organisational information (if available) should be displayed (e.g. the AIIMS IMT organisational charts, role identifying charts, information flow maps).		
Movement of people	Bottlenecks and obstructions	Pay attention to how the ability for people to move could be enhanced.		
		Move tables, desks, whiteboards etc if they are obstructing the movement of people.		
		Ensure that information is not displayed in areas where the movement of people will not be obstructed.		
Fixed technologies	Prepositioning of technology determining IMT Section and/or Unit positioning	Ensure that the positioning of fixed technologies are not negatively affecting the flow of information by inappropriately determining the location of Sections and/or Units.		
		Consider the impact of fixed technologies on the movement of people.		
Shared information display	Information presentation	Pay attention to how information is being presented in terms of adequacy and suitability.		
		Ensure that information displayed is always 'time stamped' to indicate currency. For example, information on whiteboards should have 'last updated' information clearly indicated.		
	Organisational Information	Place in a prominent place, information concerning the AIIMS Incident Management Team structure.		
		Place in a prominent place, information showing the information flow relationships between the Incident Control Centre and other coordination and control centres.		
		Clearly display key meeting and reporting times.		
	Whiteboards and/or smart-boards	Ensure that each Section and/or Unit has sufficient (at least one) whiteboards.		
		Ensure that all whiteboards are fully equipped with multi-coloured markers (NB: Some colours do not readily photocopy- e.g. green)		
		If available *SMART Boards* should be preferred to whiteboards and ensure that recording and regular 'back-up' is done.		
	Alternatives	Provide Sections and/or Units with alternative means of displaying information. For example, 'write on cling sheets', computers, projectors and/or SMART Boards.		
	Information Exchange	Ensure that Sections and/or Units have an appropriate means and method for displaying their specific information needs.		
		Ensure that all Sections and/or Units have appropriate communication processes and technologies.		
Lessons learned	Feedback	Ensure that all personnel have the means and opportunity to record both problems identified and their solutions.		

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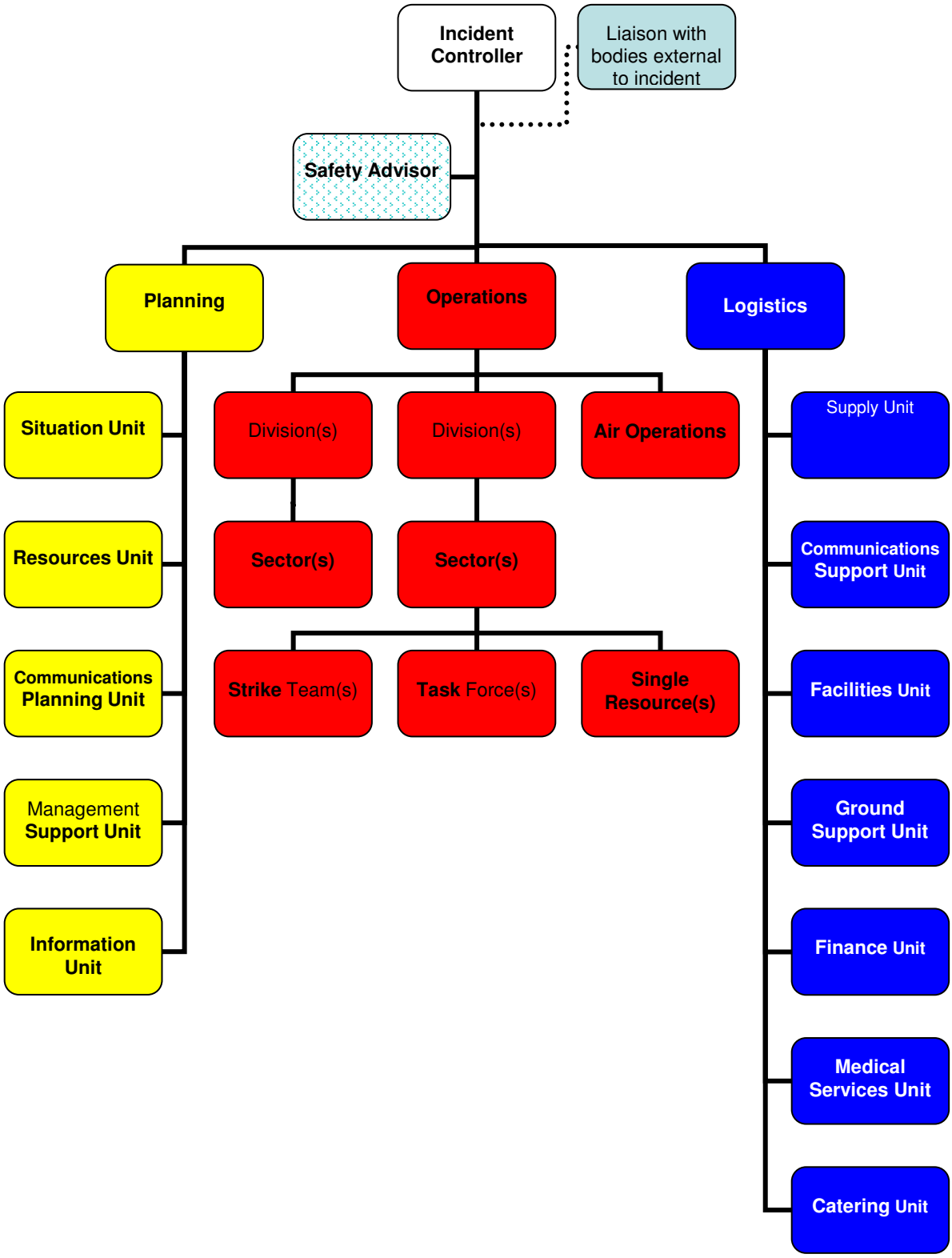
Appendix 1

Appendix 1: **The Incident Management Team role structure according to AIIMS.**



Bushfire CRC in partnership with

University of Tasmania

Methodology used for observing incident management teamwork practices

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1 Introduction

The following section of this report is an overview of the rationale, methods, methodologies, collected data and analytical approaches taken in this research project. This section is divided into four primary sections. They are:

- the rationale;
- data collection;
- sampling; and
- data analysis.

Because the training exercises were scheduled for specific times the research team were required to be opportunistic in the way in which exercises were selected for observation. Due to the seasonal nature of Incident Management Team training it was necessary to begin collecting data at the first opportunity. As a consequence the analytical approach eventually adopted for the collected data was developed inductively as the constraints of what was possible in practice became apparent through exposure to the training exercises, facilities, recording technologies and the analytical software.

2 Rationale

The rationale behind the recording methods chosen is informed by Cultural Historical Activity Theory (CHAT), shared mental models and theories relating to teamwork which focus on the activity of individuals and collectives as the unit of analysis.

The various methods adopted to record the activity under observation were intended to capture the different layers implicit in activity; room movement, body movement, speech, gestures and use of artefacts such as maps, whiteboards, paperwork, computers and telecommunication devices. By using audio recorders, video recorders, still photography and the observations of the researchers involved it was possible to analyse the collected data in commercially available software designed for the analysis of video and textual data. Floor plans of the exercise venues were also developed which allowed for the activity recorded to be correlated with the room movement and locations of the observed participants.

In addition to the video and audio recording participants were invited to complete a teamwork effectiveness questionnaire. This questionnaire was to be distributed before the training and after the training. The questionnaire was designed to gain insights into teamwork processes, self-efficacy, collective efficacy, goup potency and leadership. Participants were asked to place a unique personal identifying code on their survey forms allowing the correlation of pre and post exercise results at the level of an individual. The audio-recording data is analysed in a separate report (see Deliverable D5:22.1.4 Review of Observed IMT Training).

3 Data collection

During the observation phase of the research three different sets of data were collected. They are video, audio and questionnaires.

Table 1 shows the location and type of exercise observed. The exercises indicated as being CGS were computer generated scenario exercises. The CGS exercise held at T1, T2, T3 and T4 was the Vector Command ™ bushfire scenario (see *Vector Command ™ bushfire scenario*). The Vector Command bushfire scenario has three phases each representing a phase of an actual bushfire response. This ranges from the initial call, through to establishing and operating an Incident Management Team to recovery. At locations T1, T2 and T3 the research participants were participating in the Vector Command phase 1. Those participants at location T5 were participating in Vector Command phase 2. Human generated simulation training observed was typically conducted over a four to eight hour duration. Human generated simulation training is usually designed by an agency Regional Operations Manager or the Regional Learning and Development Officer. The simulation will include typical problems and events in real-time to match the conditions of a wild fire incident.

The period of time in the 'Observation time (mins)' column is the length of time that the total observation was underway. Because the observations contained a number of data collection methods before and after the electronic video and audio recording (e.g. distribution of questionnaires, drawing floor plans and familiarising ourselves with the personnel involved) this period of time was greater than the Data collection time (mins) value.

Table 1: The observations and the data collected.

Observation location	Type of training	Version	Observation time (mins)	Data collection time (mins)
T1	CG	1	300	273
T2	CG	1	190	145
T3	CG	1	270	223
T4	HG	1	300	300
T5	CG	2	390	376
T6a	HG	2	390	292
T6b	HG	2	390	302
T7	HG	2	525	499
T8	HG	2	570	503
T9	HG	2	390	334
T10	HG	2	420	362
T11	HG	3	450	244
T12	HG	3	413	550
T13	HG	3	339	245
Total: 13				

The next section discusses each of the each data collection tools used in the observations.

3.1 Video Data

Observations were video recorded on digital recorders. The cameras were fixed on tripods in the most advantageous point in the Incident Control Centre (ICC) in terms of the activity of the specific roles that were the focus of the observation. This provided a number of challenges in being able to capture the activity of *all* of the key IMT roles (see 'Observation Difficulties').

The equipment used to capture the data used in this research was:

- 4 x Sony 40G High Definition digital video recorders

The research team had four cameras. The number of cameras used at one observation was contingent upon:

- Whether there were multiple concurrent observations being conducted
- The spatial layout of the observation location
- The requirement to capture the activity of specific roles in the IMT

Table 2 below shows the number of cameras used at each of the training locations. Because of the spatial layout of the facilities used each location presented the research team with unique challenges. At some locations it was possible to capture the vast majority of the activity with as few as one camera (T6a and T6b) while other locations (T3, T5, and T7-T10) required as many as four (see 'Observation Difficulties' below). The '*Total video collected* (mins)' column is the sum of all video collected on all of the cameras used. The '*Duration of exercise sampled'* column shows the duration, in minutes, of the exercise selected as the sample to be analysed. The '*Video analysed* (mins) column shows, in minutes, the total duration of video analysed. Because of the use of multiple cameras and the coding of the activity of multiple roles, the total number of minutes analysed is generally greater than the value in the '*Duration of exercise sampled'* column. The exceptions here are where only one camera was used and all roles could be observed and coded from that one camera (T6a and T6b) or where the data collected was largely unsuitable for coding (due to technical issues; see 'Observation Difficulties') (T2).

The primary criteria for the data selected for analysis was to collect comparable sample periods of data from each of the observations of incident management team activity at low medium and high periods of workload. These were identified in consultation with the subject matter experts running the exercises and were based on their subjective assessments.

Because T1, T2 and T3 were all Vector Command Phase 1 exercises the same periods of time, where the same injects were put into the exercise, were selected as the sample in those three cases. T6a and T6b were Human Generated with exercises both running at the same time in different rooms. The scenarios in each room was coordinated through two instructors consulting with each other as the scenarios developed. This provided an opportunity to explore how two Incident Management Teams manage a scenario that began with identical conditions. Consequently, the same time periods from those two exercises were then selected for analysis. T4, T7-T13 were also Human Generated senarios. T7, T8, T9,T10 were consecutive

exercises held in the same location over four consecutive days with a different team on each of those days. Simarily, T11, T12, T13 were were consecutive exercises held in the same location over three consecutive days with a different team on each of those days.

Table 2: The video data collected.

Video				
Training location	**Number of cameras**	**Total video collected (mins)**	**Duration of exercise sampled (mins)**	**Video analysed (mins)**
T1	2	357	98	110
T2	2	265	61	24
T3	4	706	116	276
T4	3	774	234	159
T5	4	1119	144	255
T6a*	1	305	124	124
T6b*	1	320	119	119
T7	4	1085	153	312
T8	4	1333	243	370
T9	4	1137	321	978
T10	4	1228	0	0
T11	4	1652	84	245
T12	4	1342	102	184
T13	4	1076	78	181

3.2 Audio Data

The audio data collected during the observations was obtained by placing lapel microphones on key personnel (i.e. Incident Controller, Operations Officer, Planning Officer). At the commencement of the training exercises when personnel were approached to participate the ethical management of the data was explained. This included being advised that:

- they could turn off the recorder anytime they wanted;
- transcripts would be de-identified;
- if they decided they did not want to participate in the research during or after the observations they could have the data deleted; and
- the data would be deleted after six weeks.

During the exercise various participants turned their recorders off for the purposes of refreshment breaks. It did not appear that any of the participants disabled their recorders in order to avoid having exercise related sensitive conversation recorded.

* T6a and T6b were both held concurrently at the same facilities but in separate rooms.

At the majority of locations with the exception of T11-T13 the Logistics Section was relatively isolated from the rest of the Incident Management Team. The way in which the Logistics Section was positioned spatially in the Incident Control Centre appeared to reflect the lower levels of communicative interactivity between the Logistics Section and the other sections; Incident Control, Planning and Operations. This factor combined with the limited resources of the research team priority was given to capturing the activity of the roles; Incident Controller, Planning Officer and Operations Officer.

Table 3, below, shows the different locations of the training exercise, and the corresponding personnel on which the research team placed audio recorders. The digital audio files collected were then transcribed. In the early phase of the observations (T1, T2, T3, T4 and T5) it was decided to transcribe all of the audio data collected. This approach allowed the research team to develop an analytical framework with which the eventual analysis could be undertaken. The digital audio files collected from training exercises T6a, T6b, T7, T8, T9, T10, T11, T12 and T13 were transcribed within the parameters of the selection criteria that they corresponded, as much as possible, with the selected video data.

In the original methodological approach it was intended that the video data and audio data could be temporally correlated. This would have allowed us to analyse both speech and visible activity as corresponding in the same time, however, this was not possible for the following reasons:

(1) The digital audio recorders used did not register time codes indicating the 'starting' and/or 'stopping' of recording. Because participants, in accord with ethics approval, were instructed that they could stop the recording at any time of their choosing and/or for events such as toilet breaks and other personal matters, it was not possible to determine whether or not the participant had temporarily disabled the recorder. If the participant had disabled the recorder it was then not possible to determine the period for which it was disabled.

(2) Due to the lack of consistent clarity in the audio tracks of the video files from the static cameras it was not possible to compensate for the first issue (disabling audio recorders) by finding corresponding dialogue in both the audio transcripts (from the audio recorders) and the video audio tracks. There were some points where the transcripts could be correlated with the video, however, these were very inconsistent and time consuming for the analysts to locate. It was consequently decided that it was not technically feasible to correlate the transcripts and the activity and the analytical approach was adapted (see Analysing the Data: Video; *Phase 1 and Phase 2* below).

(3) Some of the recordings were unaudible for transcribers.

Table 3: The audio data collected.

Audio				
Training location	**Function**	**Audio collected (mins)**	**Audio transcribed (mins)**	**Audio analysed (mins)**
T1	IC	209	209	123
	Planner	243	243	120
T2	Planner	70	70	56
T3	IC	109	109	63
	Planner	172	172	122
	Operations	156	156	118
T4	IC	200	200	124
T5	IC	266	266	120
	Planner	313	313	120
	Operations	313	313	130
T6a	IC	190	120	120
T6b	IC	244	120	120
T7	IC	465	150	150
	DIC	259	0	0
	Operations	499	90	90
T8	IC	193	82	90
	Planner	503	180	180
	Operations	226	131	131
T9	IC	300	180	180
	Planner	306	180	180
	Operations	283	180	180
T10	IC	304	0	0
	Planner	281	0	0
	Operations	298	0	0
T11	IC	250	60	60
	Planner	305	60	60
	Operations	430	60	60
	Logistics	435	60	60
T12	IC	250	60	60
	Planner	350	60	60
	Operations	255	60	60
	Logistics	355	60	60

Audio				
Training location	**Function**	**Audio collected (mins)**	**Audio transcribed (mins)**	**Audio analysed (mins)**
T13	IC	313	30	30
	Planner	313	60	60
	Operations	220	54	54
	Logistics	313	60	60

The transcribers were given a number of instructions. They are:

- Do not include personal identifying information; such as names.
- Focus primarily on the voice of the participant carrying the audio recorder. Secondary voices were included in the transcriptions if reasonably audible and provided context for the voice being analysed.
- The transcription of the names of people and places was not required and "XXXX"s would be put in their places when not clearly audible or unfamiliar to the transcriber.

The audio data was transcribed into digital word documents and printed in hard copy. The electronic versions of the transcripts were imported into NVIVO for analysis.

4 Teamwork effectiveness questionnaire

As mentioned previously, the questionnaire sought to identify areas of teamwork, leadership, self-efficacy, collective efficacy and group potency. The questionnaires were developed theoretically from the Crew Resource Management literature as well as from team effectiveness indicators developed in other high-consequence domains (Cannon-Bowers & Salas 1997, 1998; Langan-Fox, Anglim, & Wilson 2004; Mohammed, & Dumville, 2001; Salas, Burke, Nicholson, 2007; Salas, Rosen, Shawn Burke, Goodwin, & Fiore, 2006; Smith-Jentsch et al. 2001; Volpe, Cannon-Bowers & Salas 1996).

In addition there were a number of team affect indicators developed from theoretical work into self and collective efficacy and group potency (e.g., Vogus & Sutcliffe 2007; Lendt, Schmidt & Schmidt 2005; Taggar and Seijts 2003; Gully Joshi et al 2002).

The questionnaire was distributed to personnel in T1-T4 before the training commenced. The participants were asked to rate how they perceive the IMT will perform during the training. After the training questionnaires were handed out to participants and filled in. The participants were asked to rate how they perceived the IMT did perform during the training. This phase was exploratory which allowed us to determine how appropriate the items in the questionnaire were. From the initial analysis it was determined that some of the questions needed to be reworded. This initial data set became version 1. After the collection of the data there was further consultation with subject matter experts including trainers. Subsequently further adjustments to the questionnaire were made.

The revised questionnaires were distributed to participants in T5-T10 via the same process. This second round of data collection became version 2. The revised

questionnaires were then distributed participants in T11-T13. This third round of data collection became version 3. Preliminary analysis of the questionnaire revealed that key questions were yielding insights and that some of the constructs (e.g. self-efficacy) were under-represented. Additional questions were added.

Table 4 (below) shows the number of participants at each of the training exercises observed. The number of participants ranged from 8 at (T6) to 40 at (T8). The percentage of participants participating in the exercise, as well as the pre observation 'teamwork effectiveness questionnaire ranged from 35 percent (T8) to 100 percent at T5. The range of training exercise participants that also completed the post training exercise 'teamwork effectiveness' questionnaire ranged from 36 percent at T1 to 100 percent at T5. Overall, approximately half of all training exercise participants also participated in both the pre and post training exercise teamwork effectiveness questionnaire.

Table 4: 'Teamwork effectiveness questionnaire' responses

Teamwork effectiveness participation					
Training location	**Total number of participants**	**Surveys: pre observation**		**Surveys: post observation**	
		N	%	N	%
T1	25	12	48	9	36
T2	25	12	48	10	40
T3	25	14	56	17	68
T4	14	9	64	10	71
T5	14	14	100	14	100
T6	10	8	80	5	50
T7	36	26	72	25	69
T8	40	14	35	19	48
T9	32	0	0	13	41
T10	32	19	59	20	63
T11	29	29	100	24	78
T12	29	29	100	24	78
T13	16	12	75	8	50
Total	**327**	**198**	**60**	**198**	**60**

4.1 Observation Difficulties

Video

There were a number of circumstantial constraints which affected the capture of the video data. In nearly all observations it was not possible with the available resources to capture all of the roles in an Incident Management Team. There are a number of reasons for this:

- The exercises observed were held at a time and place chosen by the agencies and participants involved in the exercise. Some of these exercises were held

in similar periods of time which required that the research team, and the recording equipment, be divided into two.

- Video recording was more difficult than anticipated due to the structural layout of the facilities used which made the capture of the full IMT's whole activity problematic.

Audio

There were a number of circumstantial constraints which affected the capture of the audio data:

- The research team had an insufficient number of voice recorders to enable the capture of all IMT roles.
- On one training observation, due to a technology failure, the researchers were only able capture the voice data of one participant.

5 Analysing the data

5.1 Video

Transana

Transana is a video analysis software package. Transana allows the analyst to create segments of video with 'key words', representing analytical concepts, attached. The location of these 'clipped' segments are then stored in 'collections' which represent the category within which the 'key words' are placed.

The conceptual framework used to analyse the video data was developed inductively in two stages (see Table 5 for coding).

Phase One

During the first phase (Training Exercises 1-4) it was found that some of the concepts for which codes were created were found to not be significant and were subsequently disregarded. In addition, body gestures such as pointing, shuffling paper, head nodding and shaking, in addition to being relatively insignificant for the purposes of analysis, were difficult to fully capture and code. Because the cameras were static the view of the participants were sometimes obstructed by other IMT members, had there backs turned, were obstructed by artefacts and/or were not in the viewing range of the cameras. These gaps would have resulted in the sample of such activities as arbitrary and unrepresentative.

During the coding of the video data in *Transana* the constraints of the software, in terms of how it interacts and constructs its database, became apparent; this lead to a restructuring of the analytical framework to maximise the possibilities of the software.

Because the *Transana* software is a relatively new technology the research team were required to familiarise themselves with the software while using it. As a consequence of taking this approach a significant number of methodological issues

were discovered during the process of coding the video data. The most significant of these was the categorisation of the coding concepts into categories that made coding concurrent activities problematic.

Phase Two

During the first phase of coding (see above) lessons were learnt in terms of matching the methodological requirements with the softwares capabilities. As a consequence, the conceptual framework, and the approach taken, was developed into a more refined model.

Table 5: Transana coding

Collection and Key Word Group	Key Word	Description
Communication	Incident Controller Planning Officer Operations Officer Logistics Officer Unknown1 Unknown2 Unknown3 Many	The roles of those being communicated with by the participant being observed.
Artefact	Artefact Type • Map • Whyteboard • Computer	The artefact being used by the participant being observed.
	Artefact Location • Hand • Desk • Wall • Whyteboard	The location of the artefact being used by the participant being observed.
Room Movement	Participant movement • Sitting • Standing • Walking • Hovering	The body movement of the participant being observed.
	Participant Location • A1, A2, . . ., A10 • B1, B2, . . ., B10 • C1, C2, . . ., C10 • D1, D2, . . ., D10 • E1, E2, . . ., E10 • F1, F2, . . ., F10 • G1, G2, . . ., G10 • H1, H2, . . ., H10 • I1, I2, . . ., I10 • J1, J2, . . ., J10	The room floor plan was positioned on a grid of one metre square cells. The cell indicates where the participant being observed was located.

The activity of the individual being observed was separated into three elements; communication, artefact (type and location) and room movement (participant movement and location). As a consequence the method for coding was to pass through the same video samples three times.

First Pass

In the first pass ‘time stamps’ were added at the beginning and end of the observable communicative activity of the participant being observed. The identified segment was the associated with a ‘key word’ which best described with whom the participant was communicating. If the participant was communicating with identifiable IMT roles then the key word indicating whom was selected; Incident Controller, Planning Officer, Operations Officer, Logistics Officer, Unknown 1-3. If the participant was communicating with a group of people (more than three), making an announcement as opposed to communicating directly with individuals, then the ‘key word’ many was selected.

Second Pass

In the second pass ‘time stamps’ were added at the beginning and end of the use of an artefact by the participant being observed. In addition to the artefact type the same segment of video was associated with a ‘key word’ indicating the location of the artefact being used.

Third Pass

In the third pass ‘time stamps’ were added at the beginning and end of types of the participant’s movement. For example, if the participant is standing stationary then moves to another part of the room and sits, then a ‘time stamp’ is added at the beginning of his/her standing. The last time stamp indicating the end of ‘standing’ is also the first ‘time stamp’ for walking when the participant stopped walking another ‘time stamp’ was added indicating the end of walking and the beginning of sitting. Each of these selected segments is in addition associated with the room movement cell (a) ‘key word(s)’ in which the activity occurred.

Rationale for Three Passes

By taking the approach described above (three passes) a number of analytical benefits were derived.

- The dimensions of activity (communication, artefacts and room movement) coded in each of the three coding passes were mutually exclusive and able to be defined without overlapping the other dimensions of the observed activity.
    - In ‘phase one’ where only one pass through the video data was undertaken it was apparent that some activities conceptualised overlapped other concepts. For example, when a participant was communicating with someone and using an artefact isolating that activity in one segment was problematic as the start and end of both activities might not occur at the same time; and the ‘activity’ was in fact a composite of different activities.

- The different dimensions coded can then be correlated and analysed based upon the time in which they occurred.

- This allows the determination of who was doing what with whom, and/or what, while doing what in what part of the room.

- The various activities can be correlated with room movement and location allowing for the analysis of the spatial dimensions of the observed activity.

5.2 Audio

A conceptual frame work was developed by the research team which separated the transcribed dialogue into several categories; information exchange, information flow, communicative practices, teamwork behaviours, IMT activity, cognitive load and tensions and/or contradictions, as described in Table 6 below.

Table 6: Audio coding

Category	Code	Description
Information Exchange	Giving, issuing, initiating	
	Responding, replying	
	Acknowledge	Roger, yeah, yep etc
Information Flow	Within the IMT	
	Between the team and others	Communication to other organisational entities such as fireground, RECC, MECC, IFACC etc.
Communicative Practices	Factual Statements	
	Instructing Statements	Telling others what to do
	Action Statements	What the speaker is doing now. Distinguised from Planning statements focused in the future.
	Planning Statements	Announcements, anticipatory statements, statements on intention
	Situation Awareness	Distinguished from planning statements in that they are not about what the person is going to action themselves, or request action from another, but intention of provideing awareness, and the 'picture' of what is happening
	Confirming Statements	Confirming and seeking details, misheard/clarification of something - affirmation and/or acknowledgements
	Incomplete Statements	Unfinished and/or interupted statements
	Non taks related Statements	Statements related to anything other than task at hand
	Uncertainty Statements	Expression of uncertainty and doubt - including direct

Category	Code	Description
		and indirect questions
Teamwork Behaviours	Offering and/or providing assistance	
	Receiving assistance	
	Requesting assistance	
	Monitoring	
	Negotiation	Requiring agreement or endorsement of action statement, planning statement, request something that needs to be sorted or understood
	Flexibility	The ability and willingness to adapt performance strategies quickly and appropriately to changing task and demands
	Team feedback	Team management, facilitating teamwork. Team members communicate/are invited to communicate their observations, concerns, suggestions and requests in a clear, direct and assertive manner.
	Banter, joking, sarcasm	
IMT Activity	Establish and manage	
	Assessing incident	Assess the situation, identifying risks/determining priorities (IC) collect, analyse and ulilise inc info (plan) ensure maps updated, analyse risk of incident. Report special inc/accidents (ops)
	Monitoring incident	Passive, watching or observing. Monitor inc. for changes requiring change to management structure, current and predicted inc. status, resources required, assests at risk, geographical features, status of incident resources obtaining briefing (ops)
	Reporting Actions	Developing and improving implementing, monitoring IAP
Cognitive Load	Low (casual)	Participant involved in communication not related to their work (e.g. conversation about personal life etc.)
	Medium (routine - non-challenging)	Routine work
	High (challenging)	Demand to produce

Category	Code	Description
		information (reports, sit awareness etc.)
	Very High (very challenging)	Disturbances and tensions etc. (when things go wrong or are predicted to go wrong)
Tensions, contradictions	Disturbance	

The digital audio files were transcribed into word documents. Four separate coders were used to code video-observation data. Each coded the same twenty minute segment which was then reviewed and discussed. A decision was taken to code the activity observed on the video independent of the talk collected on the lapel microphones. In part this was because it was not always possible to synchronise the talk with the activity due to the level of ICC room noise. This also allowed for recognition of multiple and sometimes overlapping physical movements that may occur within any one phrase or sentence. Doing so enabled a 88% inter-rater reliability.

5.3 Teamwork effectiveness questionnaire

Data was entered into SPSS 17 a software package for statistical analysis. Frequencies were run to check fo any errors that might occur with data entry. Both parametric and non parametric statistical analysis occurred. Prior to undertaking parametric analysis the data was tested to see whether or not the distribution is normal. With the sample size being relatively small it is appropriate to test for normal distribution. A Kolmogorov-Smirov test was undertaken to compare the scores in the sample to a normally distributed set of scores with the same mean and standard deviation. When testing to see whether or not the distribution is normal anything less than .05 violates the assumption of normality (Field 2005 and Pallant 2007). The results showed that the data has a normal distribution as the test was non significant at $p>.05$ level. Reliability tests were undertaken to ensure good internal consistency with scales that were developed (e.g. Cronach Alpha are above.7) Pallant (2007). In addition scales which met the assumptions for parametic statistical analysis could be conducted. For a discussion of the teamwork effectiveness literautre, please see deliverable 22.1.4 "Review of IMT Training".

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Appendix 3

Fire Note: Observing Teamwork in Emergency Management

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

bushfire CRC afac

FIRE NOTE

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OBSERVING TEAMWORK IN EMERGENCY MANAGEMENT

RESEARCH BACKGROUND

This research project has focused on understanding information flows and Incident Management Team Effectiveness. However, the principles and research approaches can be applied to a broad range of situations.

In any organisation or team the biggest influence on system performance is the human factor (Wilson, Burke, Priest, and Salas, 2005). Team dynamics and communication between groups or teams repeatedly arise as key features in breakdowns of coordination, near-misses and accidents (Mills and Stothard, 2000). How individuals and groups share knowledge will become increasingly critical in future in both team performance and in organisational/system performance (Stanton Baber, and Harris, 2008). In terms of emergency incident management, increased complexity comes from rising expectations from the community and other stakeholders for faster responsiveness; greater inter-dependencies between stakeholders (e.g. critical infrastructures) and from the applications of technology that change work practices.

Yet understanding what enables and inhibits teamwork and shared understanding can be difficult because of the complex tasks that may be involved in work that shifts dynamically and is fast-moving. Systematic observations can provide insight into what actually occurs rather than relying only on asking people after the event what they thought happened. It is also important that data collection during observation is not left to the whim of the observer, otherwise the data might focus on certain activities and overlook others. Having a systematic approach enhances reliability and validity (for more information go to http://www.socialresearchmethods.net/).

SUMMARY

This *Fire Note* aims to provide guidance for agencies wishing to conduct observations in fire and other emergency management contexts in a systematic manner, using the observations conducted of Incident Management Teamwork conducted within the Research Project D5 by way of an example.

Good observational methods are particularly important when evaluating teamwork and/or the impact of changes (e.g. introduction of new technologies or procedures) on individual, team and organisational (or system) performance. This *Fire Note* highlights some of the issues which can arise in this process and provides guidance that will help agencies to collect good data for reviewing and improving operations.

KEY DEFINITIONS

Taskwork: The technical aspects of team operations.

Teamwork: Interactions that are necessary to establish coordination among team members to achieve team goals.

Triangulation: Collecting data using different methods or at different data collection points to strengthen interpretations and validation (e.g., observing the same work activity over 3 different periods of time not just one).

STEPS IN USING A SYSTEMATIC METHOD OF OBSERVATION

Be focused on what the agency wants to find out.

Don't try to observe everything. What is the problem you are aiming to better understand through observation? What are you aiming to achieve? Think about what questions or problems need addressing. For example *"What might hinder a Situation Unit Officer from receiving timely information from the*

ABOUT THIS FIRE NOTE

Information Flow and Incident Management Team Effectiveness is part of Bushfire CRC Program D: Protection of People and Property.

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Operations function?" or "How do Incident Controllers and Deputy Incident Controllers share tasks to effectively perform their roles?" The measures taken need to be connected to the goals/questions the agency wants addressed and should be important enough to warrant detailed attention. Understanding why you wish to conduct the observation will also help to determine the level of detail that will be required.

Start by immersion

If possible conduct informal observations first to get a feel for the work as well as the physical layout of the organisation or site being studied. This will help refine areas for observation and determine whether the focus requires the identification of individuals or not. For example, if the focus is on the social system then the agency is likely to want to identify who interacts with whom, but if the focus is on broad tasks or how many times a new technology is used it might not be necessary to identify users.

Define and model the behaviours sought to be observed

The preliminary observation period can be used to see if the behaviours targeted are relevant or if the focus needs to be refined. For example, see Table 1 (right) for the teamwork indicators used in the study. Try to draw a model of how the elements should connect together. This helps clarify thinking and enables focus on the key points of inter-connection between work units.

Determine what needs to be measured and how it will be done

Mills and Stothard (2000) suggest there are different methods for consideration:

- *Objective methods* (e.g. observational techniques using behavioural and task-load checklists.
- *Subjective methods* (e.g. surveys assessing individuals' perceptions of teamwork and taskwork characteristics).
- *Outcome measures* (e.g. measures of successful performance such as time taken to establish an Incident Control Centre).

Frequently a research study will use a number of different measures and seek to triangulate data (see *Key Definitions*, page 1). The important thing is to make sure the behaviours to be observed are explicitly defined beforehand**.** It is also important that the behavioural categories be exhaustive and mutually exclusive (i.e. a behaviour can only be coded in one category).

Develop a behaviour classification system and determine parameters

Be selective to avoid being overwhelmed by data. For teamwork interaction the researchers used a variety of sources (see for example Wilson et.al., 2005; Stanton, Barber, and Harris, 2008). Behaviour parameters involve deciding what aspect of the behaviour is of interest. For example, how often a behaviour occurs; how much time is spent in a behaviour; how long a bout of behaviour lasts and what sequences are important (Mills and Stothard, 2000).

Develop the data collection approach

A variety of approaches can be used. In this study researchers used video-based recording as well as audio-recording of individuals undertaking particular roles. These methods served different purposes. The video was used to record how team-members used a particular space; how many times they used shared resources (e.g. whiteboard displays) and who they interacted with. The audio recording was used to record what was said and was coded for indicators of communication and teamwork interaction. For example, 'RA' is code for 'requesting assistance' (see Table 1: Examples of behavioural indicators of teamwork).

Develop a code and data sheet checklist

Sometimes it is helpful to include a code sheet (as seen in Table 1) which eases observation. This can accompany a checklist of behaviours which can be used during the observation. Ensure you understand how the data you are observing or recording will help you understand the issue or the question you are seeking to answer. Work out the level of detail you need to understand the issue at – if it is time, is it minutes or seconds that are important.

Table 1: Examples of behavioural indicators of teamwork

Supporting Behaviour Offering and requesting assistance in an effective manner both within and across teams	
PA	**Offering or Providing Assistance** *"Can I give you a hand with that?"* "I can do that if you like"
RA	**Receiving Assistance** *"Thanks buddy – that's great"*
Mo	**Monitoring** *"Have you done it yet?"*
Fle	**Flexibility** The ability and willingness to adapt performance strategies quickly and appropriately to changing task demands *"Instead of… we could..."*
Information Exchange Involves passing relevant data to team members who need it, in a timely manner. Includes transmitting and receiving	
REQ	**Receiving – requesting information/ or assistance** "Can you get … follow up…"
Communications climate The ability to enable team members to communicate their observations, concerns, suggestions and requests in a clear and direct manner without becoming hostile and defensive	
Tea	**Team feedback** Team members communicate/are invited to communicate their observations, concerns, suggestions and requests in a clear and direct and assertive manner "*We're all in this together – if you want to raise any concern then speak up…*"
Bou	**Team boundary crossing and integration** Members ensure others are involved in the information loop "*Can you make sure you're talking to resources and let them know…*"
BA	Banter/joking/sarcasm
Other	
NS	Non task related statements

END USER STATEMENT

"Developing quality research methods is critically important in high reliability organisations such as fire and emergency services. In particular, it is necessary to understand the impact of changes on the workforce and this can only be done by using a scientific, observable approach. This method will help agencies undertake their own workplace evaluations, which will in turn contribute to enhanced operational effectiveness."

– Superintendent Andrew Short AFSM
Director, School of Fire and Rescue Service Training
Queensland Fire and Rescue Service

Observe ethically
Despite good intentions, data collected through observation can sometimes be misused. There are a variety of strategies for ensuring this does not occur included in the Human Research Ethics Handbook available at: http://www.nhmrc.gov.au/publications

In this study the researchers thought about the following risks to participants and introduced the strategies detailed below to mitigate those risks:

- Participants may have been at legal risk if poor performance was observed and this subsequently led to an adverse outcome. Therefore the date and time of the observation were not included in data collection. The researchers also obtained approval to destroy the video-tape once the type of collaboration and team-based practices in evidence had been coded, and to ensure this occurred within 30 days.
- Participants might have felt unnecessary stress if they felt scrutinised or coerced into taking part. Researchers included an information sheet explaining what would be done with the data and how confidentiality would be protected, and asked participants to advise if they wanted the observation to cease, at which point the researchers would immediately cease observation. This occurred once during the study.
- Participants' professional standing could have been harmed if they were observed making a mistake and management learned of this mistake. The researchers advised management that access would not be provided to any raw data, that only de-identified and collated data would be reported and that only a sample of data observed would be included in the study.

▲ If using video or audio, look for devices that have hard disk drives so it is possible to record for the full duration of the observation and to download the digital files for import into software programs. However, be prepared to allocate a large part of a computer's memory to storage. .

▲ Researchers will need to decide how long the sampling period will be. A rule of thumb is to observe 30-60 minutes of high-tempo operations and 2-3 hours in a slower tempo, per observation. .

Recording using video
If using video or audio, look for devices that have hard disk drives so it is possible to record for the full duration of the observation and to download the digital files for import into software programs. However, be prepared to allocate a large part of a computer's memory to storage. In this study each 30-minute video file took 2 gigabytes of memory. It is, however, possible to considerably reduce the size of the video file by saving the file with a lower resolution (e.g. to fit a video file on an MP3 player). The decision on whether to reduce the file size will depend on the purpose of the video.

Observing people movement and/or use of technologies
If the way in which personnel use a facility is of interest, it is possible to make up a schematic diagram of the space and track how people move through it. In this study researchers took photographs of the facility and also measured its dimensions. They then superimposed a map-grid (e.g., A1; B2 etc) over a diagram of the layout of the room and used this to record movement and physical interaction with other functional units and items such as computers and maps.

Decide on the sampling approach
What kind of sampling supports the measures, behaviours and parameters to be obtained? You need to decide how much you want to record because it will impact on analysis time. For example, by using video in this study researchers were able to engage in *continuous sampling,* in which all occurrences of behaviour were recorded within slices of work activity collected over selected periods. The slices included low-tempo periods and high-tempo periods as well as the transition between them. However, using continuous

sampling and video was very time-consuming and resource-hungry. For example, one hour of video took approximately 10 hours to code and one hour of audio between 3 and 4 hours to transcribe and then a further 3-4 hours to code.

There are other sampling approaches that can also be used. They include:

- *Ad Libitum sampling*: observers record everything they can see happening in field notes
- *Scan sampling*: time-sampling-based systems where behaviours are observed at a particular interval (e.g. every five minutes the observer notes what the target is doing). This type of approach is best supported by a developed checklist.
- *Zero-one sampling:* where every instance of a particular behaviour is simply counted.

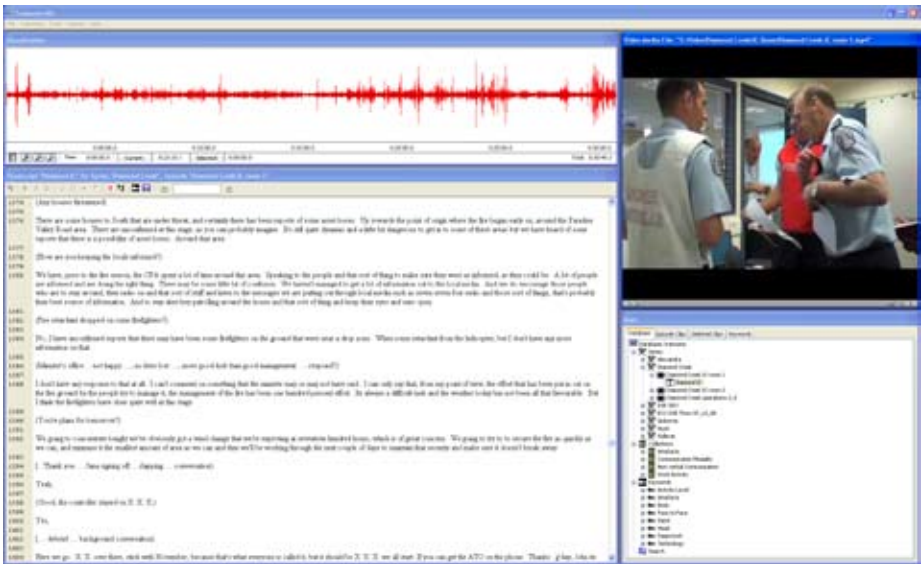
Decide on the sampling duration
It is also necessary to decide how long the sampling period will be. Mills and Stothard (2000) suggest that a rule of thumb is to observe 30-60 minutes of high-tempo operations and 2-3 hours in a slower tempo, per observation. It is important not to make the period so long that the observer becomes fatigued.

Take a small sample and analyse it ASAP
Doing a "pilot" study will help test the approach and to refine the behavioural indicators and the checklist, if one has been developed. This is important in enabling validation of the approach.

Try to use multiple observers and check for inter-observer agreement

If two observers watch the same exercise and rate the same behaviours as occurring then there can be confidence that the observation method is being conducted systematically. There are calculators to help determine inter-observer reliability at http://www.med-ed-online.org/rating/reliability.html

Decide how you wish to analyse the data
This might be as simple as using an Excel spreadsheet or, if using video, a purpose-built software program. This study used one called Transana, but there are others (NVIVO; NOLDUS). As this area is growing there will be more in the future and an Internet search on video-based observer tools would be important before starting the study. For analysis of talk from the audio files the researchers used NVIVO.



▲ There are many purpose-built software programs for video-based observational studies.

Share your insights
Conferences such as AFAC and the Knowledge Web: http://knowledgeweb.afac.com.au offer excellent opportunities for doing so.

FUTURE DIRECTIONS

Systematic observation methodologies will be an important plank in the future to assess and better understand the impact of changes in work organisation if maximum benefits of those changes are to be obtained.

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Stanton, N.A., Baber, C., & Harris, D. (2008) *Modelling command and control: Event analysis of systemic teamwork*, Aldershot UK: Ashgate

Wilson, K. A., Burke, C. S., Priest, H. A., & Salas, E. (2005). Promoting health care safety through training high reliability teams. *Quality and Safety in Health Care, 14,* 303-309

FURTHER READING

Subjective workload measure: http://humansystems.arc.nasa.gov/groups/TLX/

Inter-observer (inter-rater) reliability: http://en.wikipedia.org/wiki/Inter-rater_reliability

Social Research methods for evaluation: http://www.socialresearchmethods.net/

Teamwork and high reliability organising in fire: http://www.wildfirelessons.net/ICS.aspx

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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.

Bushfire CRC in partnership with
University of Tasmania

Guidelines for establishing an Incident Control Centre

Purpose

To provide advice for establishing an Incident Control Centre to facilitate effective information flow.

Application

Applies to all Incident Controllers, and others, responsible for establishing an Incident Control Centre.

Context

The following information provides advice for Incident Controllers on actions that can be taken when establishing an Incident Control Centre in order to facilitate optimal information flow. The advice provided derives from a Bushfire CRC and University of Tasmania research project into information flow and IMT processes. A more detailed account of the research findings can be found in the report *Enhancing information flow in Incident Control Centres*.

The advice below is given with the awareness that the facilities available vary greatly in size, configuration and resource levels and aims only to serve as a guide based on generic issues which were identified over a number of Incident Control Centres in a variety of jurisdictions.

1. Building size and configuration

The space available in the Incident Control Centre should be configured and arranged in such a way as to facilitate optimal levels of information flow. The use of space within the Incident Control Centre will largely be determined by the existing facilities.

If there are multiple rooms be aware that information silos can form by placing Sections and/or Units in separate rooms.

ACTION

- Proactively monitor the levels of communication occurring between rooms (Section and/or Units).
- Be open to rearranging the layout of the Incident Control Centre if the initial arrangement is shown to be inefficient.
- Place information showing the layout of the facilities and the locations of the AIIMS functional areas in a prominent position near the ICC main, and other, entrances.

If there are large open spaces where multiple sections and units will be operating then it is necessary to take into account the levels of environmental noise which may occur.

ACTION

- If high noise levels appear to be a potential issue then consider using whiteboards, dividing and acoustic paneling and other similar technologies as sound absorbing and deflecting devices.

2. Role, unit and section identification

To facilitate information flow all AIIMS-based sections, units and roles should be clearly identifiable.

Role identifiers

ACTION

- Ensure that the AIIMS-based roles of all personnel can be clearly identified by wearing labeled and appropriately coloured tabards and/or armbands.

Section and/or Unit identifiers

ACTION

- Ensure that all AIIMS-based Sections and/or Units can be clearly and unambiguously identified.

- Useful organisational information (if available) should be displayed. (e.g. the AIIMS IMT organisational charts, role identifying charts, information flow maps).

3. Movement of people

The ability for people to move efficiently around the Incident Control Centre enhances the flow of information around the IMT. Whiteboards, for example, can result in large numbers of people standing before them which can create bottlenecks.

Bottlenecks and obstructions

ACTION

- Pay attention to how the ability for people to move could be enhanced.

- Move tables, desks, whiteboards etc if they are obstructing the movement of people.

- Ensure that information is not displayed in areas where the movement of people will be obstructed.

4. Fixed technologies

Many Incident Control Centres are equipped with fixed technologies such as radios, telephones, computers and fax machines. These are often positioned in accordance with

their primary use which may not be that of an Incident Control Centre. It is therefore necessary that when establishing the Incident Control Centre the positioning of such equipment does not determine the overall configurations are of the Incident Control Centre and the Incident Management Team. The Incident Controller should take a proactive role in organising the facilities available in such a way that the movement of people can occur efficiently.

Prepositioning of technology determining IMT Section and/or Unit positioning

ACTION

- Ensure that the positioning of fixed technologies are not negatively affecting the flow of information by predetermining the location of Sections and/or Units.

- Consider the impact of fixed technologies on the movement of people.

5. Shared information display

Shared information display is critical in the development of shared understanding and facilitating the flow of accurate and timely information within an Incident Control Centre. There are a number of options available; each better suited to a specific purpose than the others. Technologies available include:

Information presentation

ACTION

- Pay attention to how information is being presented in terms of clarity, accuracy and timeliness.

- Ensure that information displayed is always 'time stamped' to indicate currency. For example, information on whiteboards should have 'last updated' information clearly shown.

Whiteboards and/or SMART Boards

ACTION

- Ensure that each Section and/or Unit has sufficient (at least one) whiteboards.

- Ensure that all whiteboards are fully equipped with multi-coloured markers (NB: Some colours do not readily photocopy- e.g. green)

- If available *SMART Boards* should be preferred to whiteboards as they provide a means by which information can be recorded and recalled. Ensure that recording and 'back-up' is done regularly.

Alternatives

ACTION

- Provide Sections and/or Units with alternative means of displaying information. For example:
    - 'write on cling sheets', a flexible plastic sheet which can be stuck on surfaces such as walls, boards, doors, windows etc. and written on with whiteboard markers.
    - Computers (laptops and/or desktop)
    - Data projectors
    - *SMART Boards*

Information Exchange

ACTION

- Ensure that all Sections and/or Units have appropriate communication processes and technologies.

- Ensure that Sections and/or Units have an appropriate means and method for displaying their specific information needs.

6. Communication

To facilitate information flow all Sections and/or units must have an agreed process and method for exchanging information. This involves both technological and human factors.

Lessons learned

So that solutions to problems identified during the life-time of the Incident Control Centre and IMT can be implemented in the future, opportunities for personnel to record 'lessons learned' should be provided and encouraged.

ACTION

- Ensure that all personnel have the means and opportunity to record both problems identified and their solutions.

The table below is a checklist representing the above information that can be used to ensure that the issues outlined have been taken into account.

Table 1: The guideline checklist.

Concern			Status	
Area	**Issue**	**Action**	**Done**	**Attention Required**
Building size and configuration	Rooms and information silos	Proactively monitor the levels of communication occurring between rooms (Section and/or Units).		
		Be open to rearranging the layout of the Incident Control Centre if the initial arrangement is shown to be inefficient.		
		Place information showing the layout of the facilities and the locations of the AIIMS functional areas in a prominent position near the ICC main, and other entrances.		
	Environmental noise	If high noise levels appear to be a potential issue then consider using whiteboards and other similar technologies as sound absorbing and deflecting devices.		
Role, unit and section identification	Role identifiers	Ensure that the AIIMS based roles of all personnel can be clearly identified by wearing labeled and appropriately coloured tabards and or armbands.		
	Section and/or Unit identifiers	Ensure that all AIIMS based Sections and/or Units can be clearly identified.		
		Useful organisational information (if available) should be displayed (e.g. the AIIMS IMT organisational charts, role identifying charts, information flow maps).		
Movement of people	Bottlenecks and obstructions	Pay attention to how the ability for people to move could be enhanced.		
		Move tables, desks, whiteboards etc if they are obstructing the movement of people.		
		Ensure that information is not displayed in areas where the movement of people will not be obstructed.		
Fixed technologies	Prepositioning of technology determining IMT Section and/or Unit positioning	Ensure that the positioning of fixed technologies are not negatively affecting the flow of information by inappropriately determining the location of Sections and/or Units.		
		Consider the impact of fixed technologies on the movement of people.		
Shared information display	Information presentation	Pay attention to how information is being presented in terms of adequacy and suitability.		
		Ensure that information displayed is always 'time stamped' to indicate currency. For example, information on whiteboards should have 'last updated' information clearly indicated.		
	Organisational Information	Place in a prominent place, information concerning the AIIMS Incident Management Team structure.		
		Place in a prominent place, information showing the information flow relationships between the Incident Control Centre and other coordination and control centres.		
		Clearly display key meeting and reporting times.		
	Whiteboards and/or smart-boards	Ensure that each Section and/or Unit has sufficient (at least one) whiteboards.		
		Ensure that all whiteboards are fully equipped with multi-coloured markers (NB: Some colours do not readily photocopy- e.g. green)		
		If available *SMART Boards* should be preferred to whiteboards and ensure that recording and regular 'back-up' is done.		
	Alternatives	Provide Sections and/or Units with alternative means of displaying information. For example, 'write on cling sheets', computers, projectors and/or SMART Boards.		
	Information Exchange	Ensure that Sections and/or Units have an appropriate means and method for displaying their specific information needs.		
		Ensure that all Sections and/or Units have appropriate communication processes and technologies.		
Lessons learned	Feedback	Ensure that all personnel have the means and opportunity to record both problems identified and their solutions.		