

The Problems of Maintaining Effective Teamwork During Out-of-Scale Events

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Abstract

The coordination of very large, complex, long duration, and multi-agency emergencies (what we refer to as out-of-scale events here) requires that teams form and work together quickly and effectively. In addition to the pressures of dealing with the emergency at the incident management team level and above emergency management teams will likely include people who do not know each other, may have very different skill sets and knowledge, and may be from different agencies that have different priorities and perspectives on the emergency. As the emergency continues new members are added to teams as shift replacements become necessary to manage fatigue. These factors exert pressure on the team and may lead to situations where the team lacks important information, leading to a breakdown in coordination and an impaired operational response. This paper provides a preliminary exploration of the problems of maintaining effective teamwork during out of scale emergencies through an examination of some of the broad causes of situations where one party has information that the other party does not have. Fourteen semi-structured interviews were conducted with emergency managers with experience at the IMT and above. All participants had recent experience of out-of-scale events in Australia and New Zealand. Key issues that emerged from these interviews were: Not getting to know the team and others, bypassing normal communication channels, disrupted coordination between different agencies, and sub-optimal take over of control from another team. The findings from this research demonstrate the need to consider team processes and to ensure effective information flow even under the extreme pressures of an out-of-scale emergency.

Introduction

Emergency management can be thought of as a series of complex, distributed teams sharing information within and between teams, up and down a chain-of-command. At a basic level (depending on the structure within the agency), information flows between the fireground and the incident management team (IMT), between the incident management teams and the regional coordination centre, and between the regional coordination centre and the state coordination centre. In very large, complex emergencies information will also need to be shared between different teams at the same level (who may sometimes be thought of as forming a meta-team) and between different agencies. Owen, Hickey & Douglas (2008) have outlined how all of these teams fit together in the operational response network and some of the information flow pathways between them. Information is used by people at each level to develop and maintain situational awareness, make decisions, develop plans and coordinate operations (Bearman, Grunwald, Owen & Brooks, 2013; Burke, et al., 2006; Endsley, 1996; Klein, 1998). It should be noted that the regional level does not simply act as a conduit for information between the incident management team and the state levels of coordination but uses information to fulfil important fire management roles (such as planning and monitoring the incident management teams; Bremner, Bearman & Lawson, in press). It should also be noted that information is not neutral and does not really flow around an emergency response network in any meaningful way. Information is perceived, comprehended and shared by people who are using it to construct an understanding of the situation they are operating in (Endsley, 1996).

During a very large, complex, long duration and multi-agency emergency (referred to as out-of-scale here), teams managing the incident at the IMT level and above will likely include people who do not know each other, may have very different skill sets and knowledge, and may be from different agencies that have different perspectives on the emergency and how to manage it. As the emergency continues in duration new members are added to teams as shift replacements become necessary to manage fatigue. Pre-planning for large events, and training/accrediting people to perform different roles can help to manage these issues, however, out-of-scale emergencies will nevertheless exert pressure on teams and may lead to situations where the team lacks important information, leading to breakdowns in coordinated decision making and an impaired operational response.

A breakdown in team coordination is a failure in coordination, cooperation or communication that leads to a temporary loss in the ability to function effectively (Bearman, Paletz, Orasanu and Thomas, 2010; Bearman, Grunwald, Brooks and Owen, 2013). At a more fine grained level individual instances of disruption between participants are referred to as *disconnects*. Bearman et al. (2010) have identified three types of disconnects: informational, evaluative and operational. *Informational disconnects* occur when there is "a difference in the information that each party possesses" (Bearman et al., 2010, pp179) and *evaluative disconnects* occur when there is "a difference in the evaluation or appraisal of information that is available to both parties" (Bearman et al., 2010, pp179). *Operational disconnects* occur when there is "either a difference between the actions of one party and actions expected by the other party or a mismatch in the plans that each party has about the physical operations of the response" (Bearman et al., 2010, pp178). Since this paper is interested in information flow, we will focus particularly on informational disconnects and some of the reasons why they occur in out-of-scale emergencies.

This paper then, provides a preliminary exploration of the problems of maintaining effective teamwork during out of scale emergencies through an examination of some of the broad causes of informational disconnects (i.e. situations where one party has information that the other party does not have). In other words, this paper identifies some of the reasons why people in the operational response don't have the information they need. This exploration does not seek to present a comprehensive list of reasons for informational disconnects in out of scale emergencies but highlights a preliminary set of issues that should be discussed by agencies. It should be noted that the research presented here does not imply any criticism of people who are operating under extreme conditions of stress, fatigue and very high workload. This research is designed to highlight some of the reasons why disruptions to teamwork occur during the response to out-of-scale emergencies and suggests some ways that we might prevent these from occurring in the future.

Method

Participants

Fourteen people from seven different emergency management agencies across Australia and New Zealand participated in the study. All participants had recent experience of out-of-scale emergencies. Participants' median age was 55 years and participants had on average (median) 28 years of experience dealing with emergencies and twelve years of experience in emergency management. All participants were male. Participants were interviewed in their chosen location (which was usually their office). Participants took part in the study during work time but were not otherwise paid for their participation.

Design and Procedure

A semi-structured interview method was used where participants were asked to recount incidents they had been involved with where there had been a breakdown in team coordination. These incidents were then probed for more information using neutral probes such as "why did you do x?" Interviews lasted for approximately 1 hour and were audio recorded using a handheld digital audio recorder and microphone. The digital recording was later fully transcribed.

Analysis

The transcribed interviews were analyzed using a thematic analysis technique. Thematic analysis is a bottom-up, data driven, qualitative analysis technique where themes are developed by placing similar extracts from the transcripts together in clusters. As these clusters develop extracts that could be placed into more than one theme or don't fit the emerging theme they are re-examined and the extract may be redefined or a new cluster formed. It is possible for an extract to be in more than one cluster since the emphasis of the analysis is on qualitative themes rather than independent categories. Throughout the process a name is given to the cluster that defines the essential elements of that cluster. Names are re-examined and revised as the cluster develops.

Results and Discussion

Four main themes emerged from this preliminary analysis. These themes were: not getting to know team members and others, bypassing normal communication channels, disrupted

coordination between different agencies, and sub-optimal take over of control from another team. These themes describe broad causes of informational disconnects. These themes will be presented and discussed in turn.

Not Getting to Know Team Members and Others

When teams include people who are unknown to others (as they may do in an out-of-scale event) there can be an informational disconnect about the specific skills and abilities of those team members. This lack of shared information may be exacerbated when the team is overwhelmed by events and the team leaders feel like they don't have time to get to know the members of their team.

"We didn't actually get to meet the incident controller and say who we were or what we did, there was no mating dance, none at all."

"Everyone was too busy, we had never sat down and said 'this is what we're doing, this is what I do'."

This can be a particular problem when those team members are from other agencies

"The basic thing was that we didn't know each other's agencies, or what each other's skills or resources were."

One of the outcomes of the lack of knowledge about different team members is a disruption to information sharing throughout the team

"it's like being at a party with a lot of divorcees that didn't want to talk to each other."

Tuckman (1965, 1977) proposed that teams pass through five stages of development: Forming, Storming, Norming, Performing, and Adjourning. At the forming stage, teams need to establish the boundaries of interpersonal and task behaviours. Once this has been done teams enter the storming stage where they need to manage interpersonal issues and conflict within the team. After the storming stage teams progress to the norming stage where members agree about roles and tasks and can start to function effectively. Following the norming stage the team enters the performing stage, where the team establishes a coherent identity that supports flexible task performance. Finally, the team goes into the stage of adjourning, where the team is disassembled. When teams don't get to know each other at the beginning of an emergency the stages of forming and storming can become protracted causing a problem for coordinated decision making.

One way of ensuring that information about the skills and abilities of each team member is shared is to get people to introduce themselves in early meetings.

"You wanna stand up and say what your skills are and say that you're here to help. And what that did is it laid it out and I could actually work out who I was dealing with, because they did the saying."

A longer-term solution is to provide opportunities for people to get to know others through meetings, simulations or other exercises.

"And you know really that worked very well and probably a key point in relation to why it worked well was because we have spent so much time over the past ten years

forging relationships with those agencies. We had trained together and played together. So straight away when you walked into the facility you knew the people.”

The value of such exercises is not just in forming relationships with people but also the experience of working with lots of different people and becoming familiar with other agencies and the different perspectives they can have on the emergency. According to Tuckman’s theory, building knowledge of people and roles allows the team to move more quickly through the stages of forming and storming to achieve norming and performing. Such exercises can also be designed to provide opportunities for people to identify and recover from breakdowns and disconnects.

Related to informational disconnects caused by not knowing the skills and abilities of team member are informational disconnects caused by not having the right people in the team.

“We had a manger there who actually organized all the field things. When he came in at night because we were putting the IAP together at 11 at night. He’d come and see me, that’s how I knew what was going on...It was at the end of the day when we’d actually find out how his day went and how planning went for the next day. He should have been at the planning meeting, but he was never invited in.”

It is important then to be able to identify people who have important information and to bring those people into the team.

Bypassing Normal Communication Channels

When people are overwhelmed or information flow is disrupted people may bypass normal communication channels. In such cases people often rely on informal or personal networks, making direct contact with people who they know. This can lead to team members or others in the operational response not getting the information they need (i.e. an informational disconnect).

“So we had people who were in the field operations team wanting to text me first thing in the morning so that I could bring it up at the briefing, that operations needed to do something. Well that cut out, the team supervisor, the sector supervisor, the ops manager, back the and back across to the wildfire manager.”

Such alternative lines of communication are especially likely to occur in an out-of-scale emergency when personnel are loaned out to other agencies.

“So the staff they’re doing a job over in the middle of the city.... They’re not thinking that they’re working for [organization x] or for [organization y], you know, and so they were tending to talk to our people because they know them.”

When the system is placed under pressure from an out-of-scale event and people are using informal networks, there is often some attempt to try to maintain more formal channels

“It had a lot of potential to become disjointed and muddled and we did our best to try and maintain a single channel, because we knew that you know given half a chance, it would become very confusing.”

Although such attempts can become quickly overwhelmed

"We tried to maintain some sort of line single line through a liaison person but nonetheless it sort of worked around the edges of that, that burst out in places, and we reacted to those requests as and when we got them and tried to formalize them along the way."

The reasons why people use informal networks are complex and relate to issues such as trust in people and lack of trust in the system as well as task management and information flow blockages. While there may be very good reasons why people make use of informal networks (e.g. trying to resolve an existing informational disconnect), the impact needs to be considered and strategies developed to ensure that informational disconnects don't occur where people are out of the loop and not getting the information that they need.

Disrupted Coordination Between Different Agencies

In out-of-scale events different agencies frequently need to work together to provide an effective response. The lack of understanding of the skills and abilities of people from different agencies and the use of informal networks for obtaining information by people who are 'loaned' to different agencies were discussed above. More generally cultural differences between agencies can lead to impaired information exchange and informational disconnects.

"But at that stage of the game there were, cultural divisions between agencies, and um those sort of things restrict your ability to have those conversations...It does impact on your approach to people. You don't have the free exchange of ideas, and you don't have that free debate that you would like to have. And that impacts on the analysis and therefore that impacts on the conclusions you draw. It's just a classic blocker to any communication."

Informational disconnects can also be caused by a lack of information about the role that an agency could play in an emergency response.

"[Organization x] and [organization y] really in my view were so overwhelmed with what they were dealing with, that they hardly noticed us...we spent a lot of time doing that, making ourselves available, and not being utilized. You know, we had the potential of being one of the most effective responders for them, but in actual fact they never fully utilized that."

While it is important to have clear roles and responsibilities that the different agencies have agreed to it is also important for people to develop a better understanding of how different agencies operate, the cultural differences and the way they are likely to react to different situations. One way of doing this is to provide opportunities for collaboration through multi-agency simulations. As discussed earlier the function of such simulation may be as much about developing an understanding of the different roles and perspectives held by people from different agencies as it is about developing relationships with individuals.

Sub-Optimal Take Over of Control From Another Team

In terms of the wider network involved in an operational response, teams need to form effective working relationships with other teams. In a sense such teams form a meta-team that also needs to coordinate effectively. The development of an effective working relationship is particularly important when a new team comes in to take over an emergency

that is being run by another team. When the new team does not form a good relationship with the old team, informational disconnects can occur.

“When the level three set up, for the life of me I can’t understand how they chose what was going to be the new staging area. It was a totally inappropriate location for access and all sorts of reasons. And I can’t for the life of me understand why they chose it. And they operated the [staging area] and realized it was hopeless and went to a second location which was good from the point of view of access room and that sort of thing but it was miles from anywhere. And finally after a week, they said “hang on, you guys have already got this figured out haven’t you?” and moved back to the pre-planned location. Just came back to not talking to [locals], it goes back to the communication breakdown.”

It is also the case that when a new team comes in and makes plans without exchanging information (an informational disconnect) with the team who were running the incident, conflicting plans (or operational disconnects) can be developed that lead to confusion for the personnel on the ground.

“For someone to come in and write up an incident action plan and put a different set of [radio] channels in there without consulting the locals who have already set up a plan and then cause commotion when one of the [radio] channels they chose went to the aircraft which is broad area, upset a lot of people.”

One participant suggested that it would be useful to receive training in how to take over the management of an incident.

“Its probably something that I would suggest in that incident management team level... that there is actual training on how to sidle up to the locals, and actually take control in a non threatening way.”

A recent development in fire management that has occurred in response to the increasing need for expertise in coordination at the IMT level and above has been to develop a pool of individuals who are available on a fly-in fly-out basis to assist in the management of out-of-scale emergencies around the country. While the merits of such specialists will not be debated here, one of the challenges that such teams will face is how to effectively take over the running of an incident to avoid informational and operational disconnects.

The study has a number of limitations that should be taken into account. Reports of situations where there has been a breakdown are retrospective and rely on the participant’s memory for the events. These memories can contain inaccuracies and omissions. It is also difficult to draw causal relationships or conclusions about the prevalence of the findings based on such data. However, semi-structured interviews are widely used in human factors research (Klein, Calderwood & McGregor, 1989) and are one of the few methods of collecting data about real world emergencies. Despite these limitations the method has allowed us to develop a rich contextualized account of the way in which informational disconnects occur in teams.

Conclusion

This paper then has explored the problems of maintaining effective teamwork during out-of-scale events through a consideration of some of the reasons why people in the operational response don't have information that they need (i.e. informational disconnects). Key reasons for informational disconnects that emerged from the data were: not getting to know the team and others, bypassing normal communication channels, disrupted coordination between different agencies, and sub-optimal take over of control from another team. The findings presented here provide a preliminary set of issues that should be discussed by agencies. More broadly the findings demonstrate the need to consider team processes and to ensure effective information flow even under the extreme pressures of an out-of-scale response in order to avoid informational disconnects, impaired teamwork and a degraded operational response.

References

- Bearman, C., Paletz, S.B.F., Orasanu, J. & Thomas, M.J.W. (2010). The breakdown of coordinated decision making in distributed systems. *Human Factors*, 52, 173-188.
- Bearman, C., Grunwald, J., Brooks, B., & Owen, C. (2013). Breakdowns in coordinated decision making at and above the incident management team: An analysis of three large scale Australian wildfires. Manuscript under review.
- Bearman, C., Grunwald, J., Owen, C., Brooks, B., & (2013). Information needs to support the development of accurate and appropriately situation awareness and shared mental models (Report Prepared for the Bushfire CRC Under the Project: Organizing for Effective Incident Management). Melbourne, Australia: Bushfire CRC
- Bremner, P., Bearman, C., and Lawson, A. (in press). Firefighter decision making at the local incident and regional/state control levels. In Owen, C. (Ed.). *Enhancing Individual and Team Performance in Fire and Emergency Services*. Aldershot, UK: Ashgate.
- Burke, C. S., Stagl, K. C., Salas, E., Pierce, L., & Kendall, D. (2006). Understanding team adaptation: a conceptual analysis and model. *Journal of Applied Psychology*, 91, 1189-1207.
- Endsley, M.R. (1995). Toward a Theory of Situation Awareness in Dynamic Systems. *Human Factors*, 37(1), pp. 32-64.
- Klein, G. (1998). *Sources of power: How people make decisions*. Cambridge, MA: MIT Press.
- Klein, G.A., Calderwood, R., MacGregor, D. (1989) Critical decision method for eliciting knowledge. *IEEE Trans Syst Man Cybern*; 19:462-72.
- Owen, C., Hickey, G., & Douglas, J. (2008). Mapping Information Flow During Critical Incidents.
- Tuckman, B.W. (1965). Developmental sequence in small groups. *Psychological Bulletin*, 63, 384-399.
- Tuckman, B.W. & Jensen, M.A.C. (1977). Stages of small group development revisited. *Group and Organizational Studies*, 2, 419-427.