The use of emergency operations centres in local government emergency management

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Abstract: This paper presents exploratory research into how local government emergency operations centres (EOCs) are used during emergency management preparedness activities, through a questionnaire survey of 48 organisations from New Zealand, Canada, and USA. Analysis was framed by defining effective emergency management as a person-environment fit process in which both person (competence, response management system) and environment (e.g., need for multi-agency response, decision making about complex, evolving emergencies) characteristics should be modelled in training. Each organisation was unique in their approach and the extent their EOC was active during training. Training tended to focus on implementing the structural model (e.g., CIMS) and less on developing the competencies necessary for people to operate effectively at a tactical or coordinating level of emergency management. There was recognition of a need to further develop approaches to training, with 63% of organisations stating that they would like more guidance and advice in emergency management training.

Keywords: emergency management; training; exercises; EOC; emergency operations centres; local government; crisis; disaster.

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1 Introduction

Events such as Hurricane Katrina, the 9/11 terrorist attacks and the 2004 Asian Tsunami were disasters that created catastrophic consequences for affected populations (Waugh and Streib, 2006). It is, however, important to appreciate that hazard events need not always turn into disasters. A disaster is, by definition, an event whose consequences and demands present at a level that exceeds the capacity for response. Emergency management is concerned with increasing the capacity for response and so shifting the point where a given hazard event (e.g., an earthquake) becomes a disaster (i.e., to shift the point where societal response capability is overwhelmed). A distinction can thus be drawn between a hazard event and its consequences (i.e., when it becomes a disaster). Emergency management focuses on the environmental consequences that can be managed. At the same time, it recognises that events capable of overwhelming response

capabilities can still occur. From this position, it becomes possible to see that emergency management can be conceptualised in terms of how the people responsible for it (emergency managers) interact with and relate to the environment (the source of hazard consequences to be managed). Understanding one or the other only provides part of the picture. But appreciating how people and environment interrelate in the context of emergency management provides a more comprehensive conceptualisation.

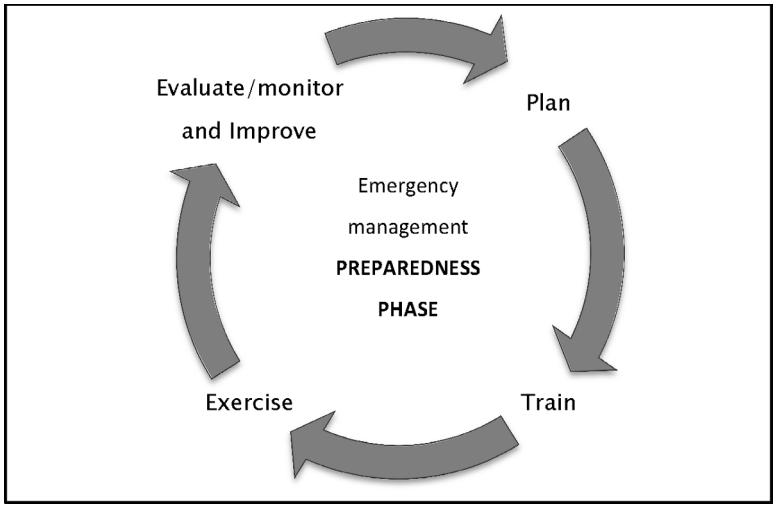
This paper uses this Person-Environment Fit perspective to examine the strengths and weaknesses of emergency management training. This approach affords opportunities to think about how the demands posed (the environment) and the capacities for response (the people) interact and how it becomes possible to develop people's (and organisational) capability to manage risk by increasing their capacity to manage hazard consequences. Adopting this approach shifts how consequences are themselves conceptualised. Focusing on the hazard (e.g., an earthquake) tends to focus attention on hazard characteristics (e.g., ground shaking) and behaviours (e.g., intensity of shaking) that are difficult to manage (though they can be reduced through mitigation). However, in a response environment context, this focus can make it difficult to appreciate how to manage consequences. However, the Person-Environment fit perspective allows preparation for several hazards (e.g., in NZ: seismic, volcanic, landslide, tsunami, etc.) through more generic training that focuses on the common denominators that arise in the response environment. For example, Paton and Violanti (1996, 2012) identified how it was possible to identify more generic event and response demands that could be used to provide a framework for emergency management training. This typology included elements such as developing situational awareness, crisis planning and decision making, working in multi-disciplinary teams, and stress resilience. This can provide a foundation for developing readiness by increasing the degree of person-environment fit by increasing the capacity of people to accommodate and manage environmental demands.

Preparedness (or readiness) is a concept that overarches most aspects of emergency management. It involves coordination between government officials, emergency workers, volunteers, and citizens (Schwab et al., 2007). The United State's Federal Emergency Management Agency (FEMA) describes preparedness as: the leadership, training, readiness exercise support, technical, and financial assistance to strengthen citizens, communities, state, local and tribal governments, and professional emergency workers as they prepare for disasters, mitigate the effects of disasters, respond to community needs after a disaster, and launch effective recovery efforts (Schwab et al., 2007). Organisations enhance their preparedness capabilities through planning, training, and performing exercises ahead of an emergency event (Schwab et al., 2007). Recently there has been increased scrutiny of existing preparedness efforts. For example Lee (2010, p.574) has identified that complacency with respect to risk reduction and emergency preparedness remains a challenge at national and local levels in New Zealand. This paper explores one reason for this; one that stems from a failure to develop training that encompasses person-environment relationships.

A simple summary of the central preparedness concepts is shown in the preparedness cycle illustrated in Figure 1 (FEMA, 2010). This cycle incorporates the planning, training, exercise and evaluation elements discussed in this paper. "In virtually every instance, emergency managers have appealed to a long-held vision of creating preparedness: first plan, then train, then exercise. This sequence of activity is both time-honoured and time-tested in the area of operational applications" (Perry, 2004, p.64). One problem with this approach is that it does not consider the strength of mental models

that develop from routine work and the need for training to develop mental models, not just technical knowledge and competencies. This led Drabek (2003) to recommend that future research should involve a comparative assessment of EOCs and managerial models across the full range of disasters and community types. This paper responds to and builds on Drabek's request by exploring the degree to which training encompasses the range of managerial mental models (which reflect the generic Person-Environment Fit issues identified by Flin (1996), Flin et al. (1997), Salas et al. (2006) and Paton and Violanti (1996, 2012)), and the capability for that training to be applied across hazards (which is more likely if training focuses on generic emergency competencies). The question is, as Drabek pointed out, whether training reflects this.

Figure 1 The preparedness cycle



Source: Adapted from FEMA (2010)

1.1 The context

Local governments have principal responsibility for mitigation and preparedness (FEMA, 2008a) and play a critical role in facilitating community resilience. As part of their response capabilities most local governments operate an Emergency Operations Centre (EOC). EOCs function as the command and communication headquarters for coordinating planning and decision-making during a disaster or an emergency. Therefore this research paper presents initial exploratory research examining Drabek's call for work on whether and how local government EOCs are used to facilitate the development of the kinds of mental models required to effectively respond in an all-hazards context. This paper represents an initial step towards more comprehensive comparative assessment of EOC training provision.

Research was carried out using recent literature and the results of a questionnaire that 48 local government departments with EOCs took part in. This paper reviews the findings from EOC operation and activation, and emergency management training, in local government organisations responsible for emergency management in their areas.

1.2 Emergency operations centres (EOCs) and emergency coordination centres (ECCs)

Kendra and Wachtendorf (2003, p.39) present a comprehensive overview of EOC's. emergency operations centres (EOCs) or emergency coordination centres (ECCs)[1] and their role in supporting operational response implementation undertaken in the field and provide for multiagency coordination (Kendra and Wachtendorf, 2003). The EOC aims to centralise at a single location the personnel and equipment that are needed to manage a response to diverse types of emergencies. The physical structure of an EOC can take a variety of forms. They tend to have a permanent location and permanent equipment with the aim of creating a stable, visible, always ready location for disaster response operations (Perry, 1995). EOCs are not fully staffed at all times; rather, they are activated only when an event crosses or might cross a certain magnitude threshold that will require a multi-agency response. This introduces a significant stressor component that can affect what is done during an emergency – in particular it increases the likelihood of people reverting back to familiar practices rather than responding to novel events. It is important that EOC facilities required are clearly defined and understood by all who are involved in the response and coordination of an emergency event. EOCs are expected to have multi-hazard response capabilities, ensuring the ability to cope with a variety of disaster types (Kendra and Wachtendorf, 2003). They function at the tactical or coordinating level of emergency management, explained below, and are organised using structures such as CIMS. Focusing on the implementation of structures such as these during training can result in the assumption that necessary core competencies are present, as well as a lack of attention being paid to the development of such competencies; issues which should be included in an effective training program.

Tactical or coordinating incident management (Paton and Owen, 2013) is concerned with adapting plans and actions to balance strategic objectives with operational (i.e., real-time) realities, within time frames measured in hours to days. Decisions at the tactical level relate to managing and mitigating the immediate and indirect effects of the emergency. This includes prioritising resource deployment to cope with limited staff and other resources to address the most pressing issues or neediest groups. This frequently involves coordination within an ad-hoc group, or between groups who may or may not be co-located, as well as coordinating with others involved in the response (e.g., community relief and recovery centres). These diverse inputs ensure more representative situational awareness and definitions of response problems (which can change rapidly as events escalate). This enables the incident management teams to prioritise problems and needs, and plan the allocation of limited resources. The performance of these activities is expedited by the ability to use analytical and crisis (e.g., naturalistic) decision making techniques. A key competence is the ability to anticipate and manage problems under conditions of uncertainty with incomplete and ambiguous data. Answers to the question raised by Drabek (2003) can be explored by determining the degree to which these competencies are developed in EOC training.

EOCs are nested within one another with the objective of regularising or making explicit communication and action links in the municipal chain of command with the majority of emergency information and coordination being processed at the local level (Perry, 1995). The amount of involvement of a higher level government EOC depends on the scale and nature of the incident. This multi-level response structure for New Zealand is shown in Figure 2. Local emergency incidents are managed at a local level through

district or city councils. Larger events include the regional councils and events that are larger still with national significance, involving the Ministry of CDEM in Wellington, and the National Crisis Management Centre (NCMC).

It is usually the EOC at the local level that acts as an over-arching organisation into which information from more specialised EOCs – such as those operated by fire and police departments – flows, and from which the overall response to the disaster is directed (Perry, 1995). Personnel in a local governmental EOC typically represent the critical organisations who respond to the disaster event. There are usually representatives from the emergency services such as police, fire fighting, emergency medical services, and public works (streets and transportation), public and private utilities (gas, water, electricity), and the Red Cross (or Salvation Army or other organisations that manage victim sheltering and welfare) and representatives of organisations associated with higher levels of government from the county, state, and or central offices. The organisations represented in the municipal EOC depend on the nature of the threat itself and on the particular net of inter-and intra-governmental resources needed to respond to that threat (Perry, 1995, p.38).

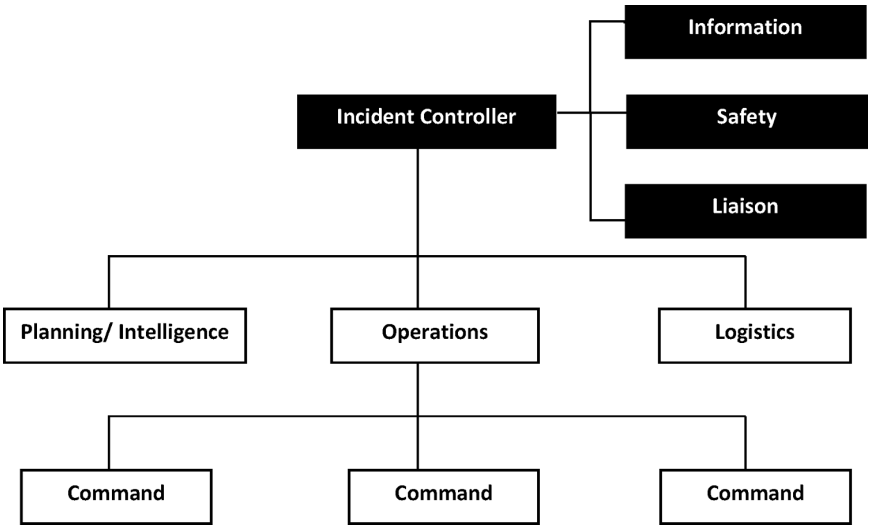
Figure 2 Levels of response coordination adapted from EMCT (2008). The level 1 and 2 responses are applicable to the Coordinated Incident Management System (CIMS), New Zealand's national command and control management structure. The emergency services usually manage level 1 and 2 events using CIMS. For Levels 3 to 5 responses have been adapted from the CIMS structure into the Emergency Coordination System (ECS) for the use in EOCs

1.3 Incident command systems and incident management systems

The critical tasks leading up to, during, and following a disaster involve coordinating multi-organisational, intergovernmental, and inter-sector response and recovery operations. In the early 1970s, because of coordination problems during large California wildfires, the incident command system (ICS) was created to integrate and coordinate fire

operations involving multiple departments (Waugh and Streib, 2006, p.134). The incident command system (ICS) or incident management system (IMS)[2] is utilised as a command and control management resource for disasters, at response levels 1 and 2 (Figure 2). The benefits of an ICS is that it provides common language and terminologies among different departments and agencies; it includes a structure that can expand or retract in accordance with each specific situation; and it allows for the integration of other jurisdictions during the response and recovery phases of disaster (McEntire and Myers, 2004, p.148). According to the Emergency Management Division of the Justice Institute of British Columbia (JIBC, 2002), the ICS has been thoroughly tested in a range of emergencies and is designed to provide an appropriate emergency response regardless of what type of emergency it is, and how many agencies or jurisdictions are involved. The ICS has been widely adopted by first responders and emergency management programmes and uses the basic structure (Figure 3) to coordinate response activities: management, operations, planning, logistics, and finance/administration (JIBC, 2002; New Zealand Fire Service Commission, 1998, p.17).

Figure 3 CIMS multi-agency response structure



Source: Adapted from New Zealand Fire Service Commission (1998, p.17)

New Zealand, Canada, and the USA each have their own adapted version of the ICS. New Zealand's version is the Coordinated Incident Management System (CIMS). "CIMS provides the model for command, control, and coordination of an emergency response. It provides a means of coordinating the efforts of agencies as they work towards the common goal of stabilising an incident and protecting life, property, and the environment" (New Zealand Fire Service Commission, 1998, p.6). British Columbia in Canada has the British Columbian Emergency Response Management System (BCERMS); the USA has the National Incident Management System (NIMS) (EMTC, 2008; FEMA, 2008b; Iannella and Henricksen, 2007).

The New Zealand ICS, CIMS, does not necessarily cover the control or coordination for functions higher than at an incident coordination level see Figure 2 (EMTC, 2008). EOC training is offered by the Emergency Management Training Centre (EMTC) and a

number of other providers as shown in the results. The EMTC's EOC training is based on CIMS (originally adapted from BCERMS) but has been modified for use in EOCs. According to the EMTC, BCERMS is compatible with and adds value to the current NZ CIMS structure and also for processes and training for use in New Zealand EOCs.

Within emergency management research literature there is considerable debate about the suitability of command and control systems such as CIMS, NIMS and BCERMS, particularly for use in large scale emergency events and disasters (Buck et al., 2006; Drabek and McEntire, 2003; Handmer, 2008; Trinka and Jenvald, 2006; Waugh and Streib, 2006). Although command and control structures are important, the emergency management department also needs to have more flexible processes to ensure that it can adjust to changing circumstances (Waugh and Streib, 2006, p.136) as the event evolves, which requires more contingent thinking rather than the prescriptive thinking characterised in a command and control environment. This highlights the need for further research into understanding the merits and drawbacks of how command and control is currently used in EOCs, where currently management systems that normally prevail in local government may be adopted rather than being developed as part of specific training and organisational needs analysis. Trinka and Jenvald (2006) suggest using role-playing and emergency management exercises as a feasible method for investigating command and control work, where information seeking, communication and data sharing of commanding staff are the aspects of interest.

Drabek and McEntire (2003, pp.105–106) critique the bureaucratic approach to emergency management in a detailed review of disaster research literature. They say that the command and control model is based on inadequate theory, incomplete evidence, weak methodology and that these problems have led to incorrect assumptions, misguided conclusions and the possibility of detrimental consequences. They concluded by stating that command and control systems currently in use by government organisations are strict, rigid, and centralised.

The command and control management system grew from WWII and is based on the need for control or the need to give impressions of control (Handmer, 2008). Handmer (2008) discusses uncertainty in the emergency situation saying that the command and control model is more an entrenched method for management rather than a practical one. Again he reiterates the inflexibility of the model and goes on to say that research suggests the decentralisation of responsibility with an emphasis on flexibility in decision making works best in beyond routine high uncertainty environments. Also supporting these claims is research by Buck et al. (2006) who conducted a critical evaluation of the ICS and NIMS. Their observations ranged from the ICS used in the urban search and rescue context to the reconstruction, recovery, and mitigation phases of disasters. They draw attention to limitations of using ICS's as a model for disaster-related organisational and inter-organisational functioning and coordination. Their final conclusions suggest that the present-day efforts to use ICSs as a comprehensive principle of disaster management probably will not succeed as intended.

1.4 Training

"The most important principle of good disaster preparedness planning is that it must include training as a key component" (Quarentelli, 1985, p.25). Planning features prominently as part of preparedness, but the crisis management of disasters does not follow automatically from disaster planning (Quarentelli, 1988). Training provides the

bridge between the planning and the actual response during a crisis and defines how person and environment can be more effectively linked. Fundamental to disaster readiness planning is developing training strategies to compensate for the limited opportunities available for acquiring actual disaster response experience (Paton and Jackson, 2002).

Training is the systematic acquisition of knowledge, skills, and attitudes with the goal of developing competencies necessary for effective performance in work environments (Salas et al., 2006). Training in emergency management is the activity that translates information defined as needed by the plan into a coherent programme that can be conveyed to responders (Perry and Peterson, 1999, p.243). Emergency management training teaches people how to respond to new stresses presented by a disaster; it also teaches the accepted norms of carrying out a job or skill and should include elements to develop stress resilience. Training should incorporate key officials and must focus on the procedures that will take place in the EOC (McEntire and Myers, 2004, p.148). An effective training program should be based upon a dedicated training needs analysis conducted prior to development.

The quality of response and recovery efforts is directly linked to the experience, knowledge and skills possessed by staff working at disaster sites (Flin, 1996; Schaafstal et al., 2001). However, opportunities to obtain this experience are limited by the rarity and unexpectedness of these events. Training is expensive both in finance and time, and with limited resources it is essential that the training event delivers effective learning (Wilson, 2000, p.105). Essential to increasing training effectiveness when dealing with infrequent events is the use of exercises and simulations designed to challenge assumptions. In general, training designed to develop the capability of operational mental models (essential to response planning and organising action) to impose coherence upon atypical and challenging experiences and to accommodate the demands encountered should be an essential component of stress risk management (Dunning et al., 2003; Paton, 1994; Paton and Hannan, 2004). A capacity for re-framing can be developed using simulations, which provide opportunities to conceptualise and review response activities, construct realistic performance expectations, increase awareness of stress reactions, and rehearse strategies to deal with stressful circumstances and reactions (Crego and Spinks, 1997; Paton, 1994; Paton and Jackson, 2002). They can also identify areas for personal and organisational development.

Developing these more sophisticated psychological structures requires that simulations are constructed using information derived from two sources. One concerns the systematic analysis of the competencies required for effective response to hazard events. The second involves designing simulations capable of reconciling the demands of incident coordination and management (e.g., dealing with uncertainty, situational awareness, responding to multiple needs) with the competencies required to manage them (e.g., hazard identification and interpretation; adapting plans; team and multi-agency operations; information and decision management) in ways that promote adaptive capacity (Paton, 1994; Paton et al., 1999; Pollock et al., 2003).

1.5 Exercises

Most industrialised countries have mandates concerning exercises, which underscore the importance of such activities to the preparedness process (McEntire and Myers, 2004, p.148). Exercises are an integrated part of the umbrella term ‘training’. An exercise is an

activity that stimulates a situation in order to test procedures and provides practice for participants in defined roles (MCDEM, 2009). Simulation exercises provide the only experiential means by which to train people in an environment that is as realistic as possible for an as yet unknown crisis (Borodzicz and van Harperen, 2002, p.139). Exercises can also be methodological tools for evaluation research, for testing previous training, for providing exercise managers and researchers with the opportunity to test the effectiveness of emergency plans, and for testing the abilities of personnel to execute these plans (Perry and Peterson, 1999; Trinka and Jenvald, 2006).

Many exercises involve scenarios or role-playing games. A scenario is a reconstruction of past events or, more commonly, a hypothetical construction of a future one. Scenarios induce participants to think through the consequences of decisions and actions (Alexander, 2000). "A role-playing game (RPG) is an interactive multi-person setting, where participants try to solve a problem or overcome various obstacles in a collaborative manner" (Trinka and Jenvald, 2006, p.219). Simulated crisis scenarios are frequently cited as effective tools for organisational and individual learning (Borodzicz and van Harperen, 2002). Training people for critical and dangerous incidents requires realism in the training situation without putting the participants at risk. It is also important that the participating trainees effectively learn from their performance during training and this, as well as providing useful tests of systems and procedures, is more likely to be accomplished when exercises are designed to challenge assumptions and present participants with experiences that are problematic and that provide a context for learning (Paton and Auld, 2006). The understanding by all participants of the overall task force goal and the importance of cooperation between sub-units and amongst different agencies motivates trainees and enhances learning effectiveness (Kincaid et al., 2003).

New Zealand's National CDEM Plan (MCDEM, 2009) stipulates the establishment of a National Exercise Programme. The order states that: A national CDEM exercise programme is a means by which the operational capability of agencies, and CDEM Groups and their partners, such as lifeline utilities, may be tested in relation to civil defence emergency management. The National Exercise Programme is to be supplemented by regular agency and local exercises; and seeks to exercise the operational arrangements within this plan, CDEM Group plans, and departmental emergency management plans, so as to improve response at group and national levels and to assess the readiness of participants. This programme recognises that exercising needs to occur at all levels of the CDEM structure and that assessment must occur. In New Zealand emergency management a four-tier approach to exercising has been adopted. Each tier is expected to be based on and informed by a consistent regime of planning, observation, evaluation, monitoring, and continuous improvement (MCDEM, 2009).

The MCDEM (2009) tier structure is as follows:

- local exercise (individual organisation)
- group exercise (with CDEM Group)
- inter-group exercise (across CDEM Groups, may include MCDEM)
- national exercise (New Zealand or part thereof, including central government).

Furthermore the ministry advises;

> "A well designed exercise programme focuses on continuous improvement and uses different types of exercise to meet agency objectives and exercise programme goals. Multi-year plans build capabilities by using a step-by-step approach where planning and training are linked to exercise activities that get more complex over time. Multi-year plans should be reviewed once a year to reconfirm the exercise schedule and to share lessons identified and recommendations for improvement. Representatives from all agencies involved are expected to provide resources and personnel toward the activities scheduled. For an exercise programme to be effective it needs to be agreed by all agencies involved and these agencies must buy into the programme." (MCDEM, 2009, p.12)

1.6 Types of emergency management exercises:

There are five common types of exercise used in emergency management. They are orientation, tabletop, drills, functional exercises, and full scale exercises (Fagel, 2010; Green, 2000; MCDEM, 2009; Perry, 2004).

Orientation exercises are an overview or introduction, usually used to familiarise the players with an activity. They can be referred to as a lecture, seminar, or 'walk through' exercise where it puts people in the place they would work during an event, or uses them as participants in a demonstration of an activity (Fagel, 2010; Green, 2000; MCDEM, 2009).

A *tabletop* exercise may also be referred to as a *discussion* exercise. It is a seminar type discussion with problems interjected by messages. Participants are usually presented with a situation or problem that they are required to discuss as well as formulate the appropriate response or solution. Normally, the exercise requires no simulation other than a scenario and, or, prewritten exercise injects. This type of exercise is used to practice problem solving and coordination of services with or without time pressures. There is no deployment or actual use of equipment or resources (Green, 2000; MCDEM, 2009; Perry, 2004).

A *drill* is a coordinated, supervised exercise where staff physically handle specialised equipment or perform a specific procedure. It is used to test a single operation or function and there is no attempt to coordinate organisations or fully activate the EOC. The exercise usually has a time frame element and is often used to test procedures (Fagel, 2010; Green, 2000; MCDEM, 2009).

A *functional* exercise may also be referred to as an *operational* or a *tactical* exercise. It takes place in an operational environment and requires participants to actually perform the functions of their roles. A normally complex response activity is simulated, which lacks only the people 'on the ground' to create a full-scale exercise. Participants interact within a simulated environment through an exercise control group who provide prewritten injects and respond to questions and tasks developing out of the exercise. Functional exercises normally involve multi-agency participation (real or simulated) and it can focus on one or many geographical areas. This type of exercise is used to practice multiple emergency functions, for example; direction and control, resource management and communications (Green, 2000; MCDEM, 2009; Perry, 2004).

A *full scale* exercise may also be referred to as a *practical* or *field* exercise and is used to simulate a real event as closely as possible. The exercises can be limited to the physical response on the ground, or may include higher level response structures.

They can be simple (single agency) or complex (multi agency). These exercises are typically used to test all aspects of a component of emergency management (Fagel, 2010; Green, 2000; MCDEM, 2009; Perry, 2004).

2 Methodology

A questionnaire based survey approach was used in this research to investigate local government organisation's preparedness activities in real emergencies and in training and simulations within the operating EOC. An extensive literature review, and advice from experts in the field, guided the development of the questions that were designed to explore the implementation of training programs across the emergency management sector. A combination of closed and open ended questions were used in the questionnaire resulting in analysis both qualitatively and quantitatively. For the free text open-ended responses thematic analysis (Braun and Clarke, 2006; Ryan and Bernard, 2000) was used to find patterns of meaning by using basic coding procedures.

The local government organisations that participated in this study were from New Zealand, British Columbia, Canada, and from California, Colorado, and Washington in the USA. All those who answered the questionnaire were either the emergency manager of the organisation or their emergency management advisor. They were instructed at the beginning of the questionnaire to answer the questions from the point of view of the organisation they worked for. This aimed to give an accurate representation of how each organisation operates.

Each organisation was asked if they would like to participate in the study by answering an electronic questionnaire. Table 1 lists the different types of organisations that responded to the study. Thirty-six North American government organisations were asked to participate, 12 of which returned the questionnaire. Attempts were made to contact all regional, district, and city councils in New Zealand, via phone calls. Of the 61 New Zealand councils successfully contacted, 36 completed and returned the questionnaire. Seven NZ local councils, particularly in the more isolated areas, indicated that all of their emergency management communication and information goes through the regional council. A total of 48 completed questionnaires were received out of 96 organisations contacted.

Table 1 Number and type of participating organisations (n = 48)

Type of organisation	*Number of participating organisations*	*Percentage*
Canada Municipality	1	2
USA State EM Office*	2	4
USA County EM Office	4	8
Canada Regional District	5	10
NZ Regional Council	8	17
NZ City/District Council	28	58

*Also includes a FEMA department group called Region X.

3 Results

We focus in this paper on the questions that reviewed EOC activation and training (Appendix A). Initial questions in the survey established that most participating organisations (83%) had been impacted by a hazard in their community within the last five years (Table 2). All participants stated they had an EOC, and most organisations activated their EOC in real events (Figure 4) and in training (Figure 5). For almost all organisations surveyed, threat from hazards is a real possibility and preparedness is taken seriously.

Table 2 The range of hazards that the organisation has been affected by over the last five years

Hazard event	*Percentage of organisations impacted by event* (%)
Flooding	52
Tsunami	42
Storm/extreme weather/snow/wind	40
Wildfire	19
Landslide	17
Epidemic/pandemic	10
Tornado	10
Earthquake	6
Hazardous spill	6
Man-made hazard (inc industrial fire, shootings)	6
Drought	4
Volcano	4
No events reported/no answer	17

Figure 4 Results for EOC activation in real events over the last five years

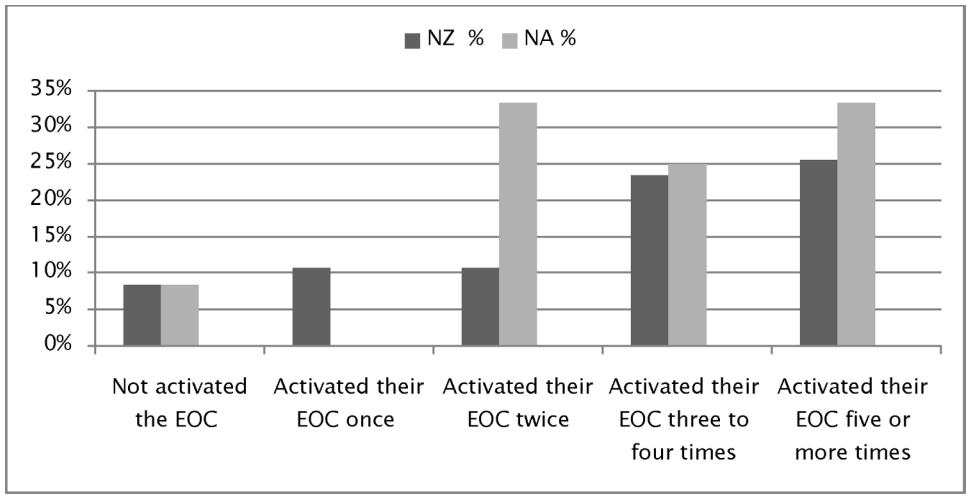
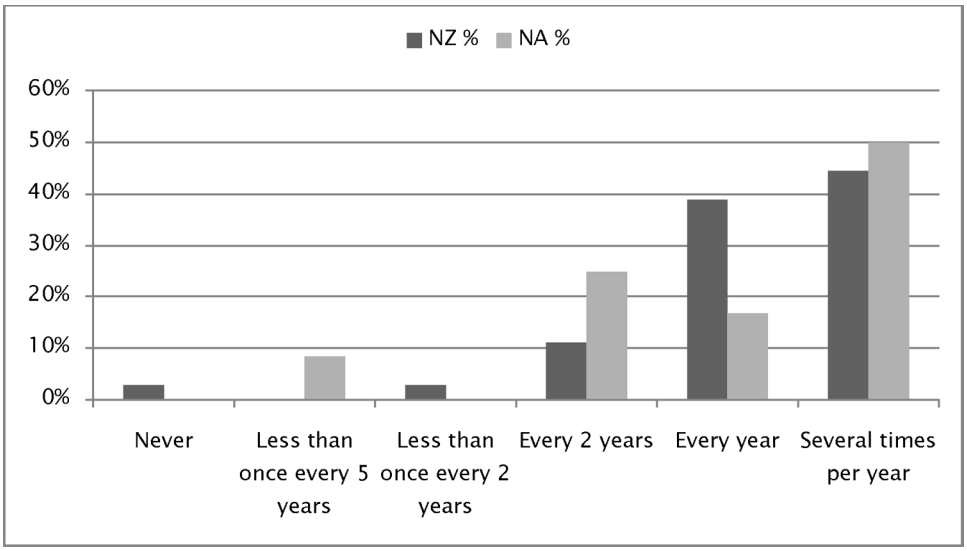


Figure 5 Results for EOC activation in training or simulations



3.1 EOC activation

All but one organisation said that they activated their EOC in training or simulations. When asked to detail the training program that the organisation's EOC followed, most participated in various different exercises ranging from table-top and orientation, to full-scale, and used role-playing or simulations regularly. Throughout the answers there were often references to specific courses or organisations that offered training. In New Zealand these were the Group Emergency Operations Centre (GEOC) training, the Emergency Management Training Centre (EMTC) unit standards, Telford Rural Polytechnic, Emergency Coordination Centre Level 2 and 3 (ECC2 and ECC3),[3] CIMS courses of varying levels and NZ's Ministry of Civil Defence and Emergency Management (MCDEM)'s courses. In Canada there were mentions of BCERMS courses, also of varying levels. Two major New Zealand exercises were mentioned, Exercise Pandora and Exercise Ruamoko. Exercise Pandora has been held almost every year since 1995 and aims to practice and evaluate response procedures and the effectiveness of the Group ECC and the Territorial Authority EOC's in the Canterbury CDEM Group area (Christchurch City Council, 2011). Exercise Ruamoko was a national-level exercise conducted in accordance with the National Exercise Programme, held in 2008 to test national response to simulated volcanic activity in Auckland (Auckland Regional Civil Defence Group, 2011). Participants referred to the ICS 9 times, often in relation to EOC training.

One NZ organisation detailed their 10-module training programme with course titles such as Basic CDEM, Stress Management, Health and Safety, Skills Rotation 1 and 2, CIMS levels 2 and 4, 'Welfare centre staff', and 'Welfare centre manager'. Another North American organisation described their programme of small module training called "*90 minutes to success*". These sessions were timed to fit into the meeting schedule during the most productive time of day (10:30 to 12:00 noon) to maximise participation and engagement.

One NZ organisation stated:

> "Training is not specifically managed around the EOC but in relation to the roles required to manage an event. This means there is a structured training programme for Emergency Volunteers in Welfare Centres, Area HQs and Community Emergency Centres. Then there are training courses for EOC Staff. All programmes use Unit Standards, via EMTC, Telford or other training establishments, as well as non-unit standards by a variety of providers. Then there are facility and equipment training evenings for Emergency Volunteers, pre-exercise refreshers for EOC Staff and other ad-hoc opportunities as and when they arise."

Another New Zealand organisation stated that they were using morning tea sessions involving all emergency agencies, contractors, and council so the EOC staff could build relationships with the people they may need to work with during an emergency. One participant said that a formal training programme was developed and overseen by their CDEM Group Training Officer.

3.2 Training

Unrelated to EOC activation, organisations were asked about their participation in training, exercises and simulations. 94% of organisations participated in or conducted civil defence emergency management training or simulations. Three out of the 48 participants said that they have an EOC but do not use it for training, and do not do any emergency management training at all. These were all North American organisations, one from California, one from British Columbia, and one from Washington State. Despite some slight differences across some questions (Table 3), the overall result is that almost all organisations participated in emergency management training or simulations. For each of the five different exercise types, tabletop, drill, orientation, functional and full scale participants were asked how often they used them as a training method. Overall it is shown that most organisations follow a training program and most participate in a range of different types of exercises (Table 4). Following these questions the participants were asked if during these exercises they activated their EOC for training and exercises. All participants did activate their EOC, however only 25% '*always'* activated for exercises (Figure 6).

Participants were asked to detail their training program if they had not already done so. Most of the 12 answers were similar or a repeat of their earlier answers. Some notable comments are presented in Table 5.

Participants were then asked if they or their organisation would be interested in receiving more advice or guidance in the area of emergency management training. 63% of participants said yes they would to this question. Following this, when asked to describe what would help, their answers are summarised as follows:

- 12 participants wanted more information, advice, or ideas on emergency management training
- 4 participants stated more funding was needed for training
- 2 participants wanted more specific information of the emergency management structure, delegation, and hierarchy

- 2 British Columbian participants and one NZ participant stated they did not need anything further, they were satisfied with their programme and that they offered advice to others or would be able to do so in the future.

In addition there were several references to the ad hoc nature of emergency management training in NZ. A number of notable quotes are collated in Table 6.

Eleven respondents provided further comments at the end of the questionnaire regarding training. In particular, two respondents said that they were considerably constrained by budget. One respondent stated that they had problems with attendance to emergency management training.

Table 3 Comparison of respondent's answers to two different questions demonstrating some inconsistencies in answers

Respondents who answered 'none' to question asking participants to summarise emergency events their organisation had experienced	*Same respondent's answer to a question asking participant to name or describe events where their EOC had been activated*
None	Tamahare Fire – killed or wounded 5 Fire Fighters Tornado Flooding × 8 evacuations × 4 Samoa Tsunami threat – Evacuation of four coastal towns Chile Tsunami threat – no evacuations
None	
None	n/a
The last declared emergency was in 1988, in May and again in September	But no Civil Defence declaration was made A wind storm of 2008 and local flooding of 2008. Both require limited activation of the EOC
None	Storm Flooding and inundation
None	2010 Olympic and Paralympics Winter Games. Recent Landslide in the Pemberton Valley. Blackcomb Mtn. wildfire – 2009
None	Wild land fire and flooding
None	Pan Flu Exercises Flooding Winter Storms

Table 4 Different types of exercises organisations used and how often $n = 48$

		Frequency of the exercise				
		Several times per year (%)	*Every year* (%)	*Every two years* (%)	*Less than every two years* (%)	*Never* (%)
Type of exercise	Table top	35	*38*	2	15	6
	Drills	25	*38*	10	15	13
	Orientation, lectures, seminars	*50*	33	4	2	10
	Functional, operational, tactical	21	*38*	23	10	8
	Full scale	2	33	15	*35*	15

Figure 6 Results showing percentages of organisations that opened and activated their EOC's during emergency management exercises

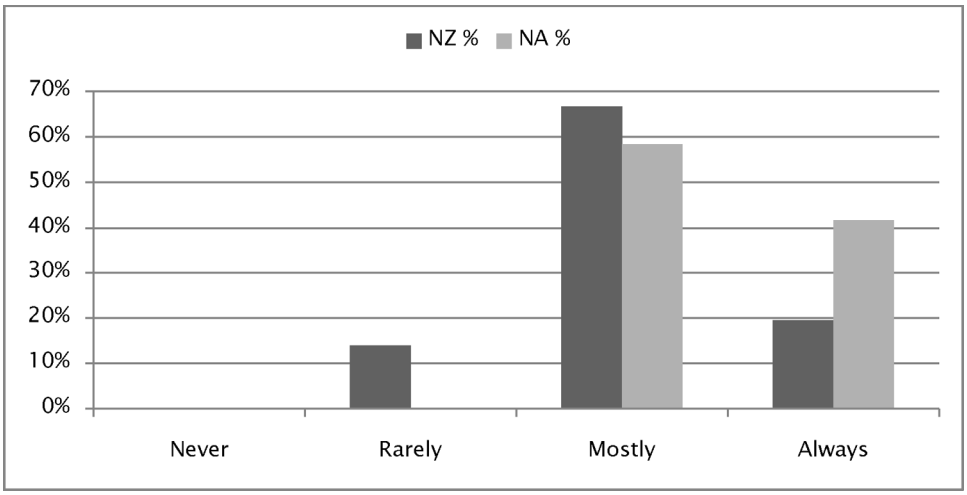


Table 5 Participants were asked to detail their training program if they had not already done so, some notable comments were

"Many of the training methods mentioned above have been included in our CIMS 4 training conducted annually over last 2 years."
"Canterbury[1] Group has a 3-year exercise rotation and we have to fit in with that and undertake our own exercising and training as well."
"Training also includes radio communications. Testing is done on a weekly basis over the whole area. EOC training does not include radio communications training as it is done separately."
"Training includes specific EOC training course – i.e. we have a two day course this month specifically for EOC training that will be attended by a variety of personnel."

[1]Canterbury is a region of New Zealand.

Table 6 Notable quotes when participants were asked what would help organisations with training

"Canterbury has the luxury of regional CDEM training support."
"Ministry Of Civil Defence should run more training for higher level training. We used to have a stand-alone training school and the Ministry done away with it. This is the only thing they did well and they sold it off."
"The re-establishment of a full time training officer in the local office."
"A standardised training system for CD across the country."
"How to reduce the workload on the EMO so they can focus on the outcomes not the exercise logistics."
"Training is very much an evolutionary process i.e. you provide the basic framework of training and then the rest is ad hoc and there is a dependence on community feedback and requests for further training."
"Our current operation could be described as like 'Dad's Army'. Much improvement is required."
"A national training school for CD officers and selected ECC staff."

In addition during August 2010, when the questionnaire was distributed, the Auckland area was undergoing a change in their government structure where many of the local councils were amalgamating to form a larger council, called the *Auckland Council*. This change was due to be completed in November 2010 (Auckland Council, 2010). Several of the respondents noted this change in their answers to this question saying that they were unsure of how emergency management training was going to be carried out in the future.

4 Discussion

Lee (2010, p.573) studied New Zealand CDEM Groups and said that there was considerable variation from individual performance within regional groups and that some of these groups lack leadership and coordination. The findings of this study also reflect this. While all EOCs were activated for training and exercises at least occasionally, each organisation was unique in the training and exercise programme they were involved in and to what extent their EOC was active during the training. The majority of organisations participated in tabletop, drills, and orientation exercises frequently, at least once a year or more. However, they tended to focus on exercising the incident management structure rather than identifying the competencies needed to put that structure into practice. None used their exercises to support the kind of training need analyses required to develop the mental models that facilitate functioning in high demand, evolving environments. Rather they focused on roles ascribed to people instead of developing the Person-Environment Fit in ways that would contribute to the development of the mental models identified as needed by Drabek (2003). Furthermore, none recognised how stress could affect functioning and none used EOC exercises to develop stress resilience. This is reflected in the fact that functional exercises were conducted less frequently, and full scale exercises were conducted even more infrequently, with only 2% of organisations participating in this type of exercise every year. Fifteen percent of the participating organisations had never used full scale exercises. This is to be expected as functional and full scale exercises are typically costly and both time and resource intensive (Fagel, 2010, p.181; Wilson, 2000, p.105). However, by not conducting these exercises these organisations expose themselves to an increased risk of a hazard event becoming a disaster. In addition they deny themselves the opportunity to use exercises to conduct the kind of residual risk assessment that is essential to future training needs analysis, organisational development and the progressive development of competencies required to deal with highly complex emergencies.

Some disparity has been identified between recent research and the practices of local government organisations regarding the ICS. ICSs of one sort or another (CIMS, NIMS, BCERMS) were referred to by organisations throughout the survey. ICSs provide structure and theory that simplifies training programmes and gives solid foundations for local government organisation management frameworks (McEntire and Myers, 2004). However, more conclusive research is required to discover how beneficial ICSs are when applied to the EOC environment. It is largely unknown how beneficial these systems are in practice and it is possible EOC managers are being lulled into a false sense of security by depending on these systems especially in developing their training programs. Recent studies have warned against relying too heavily on them and suggest that there is a need for increased flexibility and innovation in the response situation (Drabek and McEntire,

2003; McEntire and Myers, 2004). Training programs needs to incorporate flexibility and innovation as well as learning the organisational frameworks and delegated roles offered by teaching ICS.

In New Zealand, legislation mandates the existence of a training and exercise programme and stipulates the importance of monitoring and evaluating the programme (MCDEM, 2002). However, results from this research indicate that these concepts are disconnected in practice. While each organisation does follow a training program it is unclear how successful each organisation is at the practical application of it. Perry (1995) writes that there is little social scientific data available to guide emergency managers in the operations of EOCs. In this study 63% of participants said they would like more guidance and advice in emergency management training. In agreement with Perry, these results reveal that local government organisations want and need more information and guidance in emergency management training.

The findings of this research indicate that very little is understood about how training for each individual government organisation is carried out. Research is yet to determine the full extent of how an EOC can be utilised to its advantage within the local government emergency management office. The first major assessment of NZ national CDEM capability since the CDEM Act's implementation in 2002 was due for completion in 2011 (Lee, 2010, p.574). Together with this research a clearer picture of how local government organisations prepare for emergencies is beginning to emerge. With this understanding future more specific research can be designed.

Local government organisations in this study are predominantly aware of the risks from hazards that their communities face and understand that they play a critical role in achieving community resilience to disasters. Therefore research in this area should be considered as a high priority, specifically in how EOCs could be used to the advantage of government organisations and the community during training, and in exercises. Considering this, these organisations both in New Zealand and in other parts of the developed world should be a central focus for future research and emergency management preparedness activities. By strengthening the capabilities of local government organisations we are strengthening the resilience of the communities they strive to protect. This paper now concludes with some recommendations.

4.1 Recommendations for the future

This paper has provided some preliminary investigative research about emergency management in local government organisations. Particular focus was on how they utilise their EOC, how they train and what exercises these organisations participate in. More questions were raised than were answered. There is a great need for researchers to take a closer look at the preparedness activities of local government organisations. Research instigated by the following questions could provide a starting point for enhancing the preparedness of emergency managers and emergency organisations.

Emergency management and EOCs

- What roles do EOCs play in local government organisations?
- How could EOCs be better utilised during the preparedness activities of local governments to enhance response capabilities during an emergency?

Emergency management training

- How are training programmes designed and implemented within local government organisations?
- Do these training programs improve the organisation's response capabilities?
- Do local government organisations want or need more national guidance and standardisation for training and exercise programmes?

Answers to the research questions above would help develop more proficient preparedness activities. From our current research we make the following recommended actions that could be implemented by any level of government in the immediate future.

- Consider how to better utilise the EOC during training and exercises.
- Critically evaluate the use of ICSs within the EOC.
- Ensure local government organisations are aware of and have access to emergency management resources such as literature and local training providers.

5 Limitations of this research

There were 36 out of a total of 73 New Zealand organisations that participated in this research and 12 North American organisations. Despite the relatively small sample size this study has highlighted the varying degree of preparedness activities and EOC training of local government organisations and successfully identified areas of interest for future research.

There were some instances of differences across questions in some participants' answers (Table 3). It is possible that in these instances these questions were misread or misinterpreted, for example participants may have had varying perceptions of what constitutes EOC *activation*. Along with the questionnaire each participant received a definition sheet explaining key terms used in the questionnaire. Referring to this sheet was optional and it is unknown if participants used this sheet to prompt their own level of knowledge about the subjects. This may have given a misrepresentative answer to some questions. A more comprehensive questionnaire and interview process with more specific questions based on the recommendations of this research will provide a clearer picture of emergency management preparedness activities in local government organisations.

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Notes

[1]An emergency operations centre (EOC) or an emergency coordination centre (ECC), are essentially the same. On occasion there may be a distinction between an EOC as being the city or district central operational point and the ECC as being the same but at a group or regional level. For the purpose of this paper EOC will be the term used to describe either an EOC or ECC.

[2]Some agencies use the term incident command systems (ICS), while the more recently evolved term is IMS. For simplicity ICS will be used.

[3]The course provider is unknown.

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Appendix A

Select questions from a survey of local government organisations emergency management offices.

1 Does your organisation use tabletop exercises as a training method?

2 Does your organisation use Drills as a training method?

3 Does your organisation use orientation exercises, lectures, seminars, or discussions as a training method?

4 Does your organisation use Functional, Operational or Tactical exercises as a training method?

5 Does your organisation use Full Scale exercises as a training method?

6 Do the emergency management training exercises include the opening and activation of the EOC if you have one?

7 If you have not already addressed this in your answers so far can you please detail the training program your organisation follows in the space below?

8 Would, you or your organisation be interested in receiving more advice or guidance in the area of emergency management training?

9 Describe what could help

10 Are there any other comments you would like to add?