LOCAL GOVERNMENT EMERGENCY MANAGEMENT:

EMERGENCY OPERATIONS CENTRES, TRAINING AND DECISION MAKING

A THESIS PRESENTED IN PARTIAL FULFILMENT OF A MASTERS IN EMERGENCY MANAGEMENT

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ABSTRACT

Local government organisations play a critical role in achieving community resilience to disasters. As part of their response capabilities most local governments operate an Emergency Operations Centre (EOC). EOCs function as the command and communication headquarters for planning and decision-making during a disaster or an emergency. This thesis has two research objectives. The first is to conduct preliminary exploratory research about how local government EOCs are used during preparedness activities. The second is to contribute information and recommendations that could better equip emergency managers to prepare for and respond to emergencies and disasters.

The broad concepts and common terminology of contemporary emergency management are introduced. Information about the jurisdictional terminology, frameworks, and the major emergency management organisations for New Zealand, Canada, and USA are discussed. Research was carried out using recent literature and the results of a questionnaire that 48 local government departments with EOCs participated in. This investigation was guided by seven research questions from three inter-related areas of investigation. They are EOC operation and activation, emergency management training, and emergency management decision making.

Literature shows there is a growing realisation that many disaster preparedness practices are based largely upon anecdote and are lacking systematic study or objective validation. Results and conclusions presented in this thesis reveal local government organisations need and desire more information and support in operating their EOC, and in emergency management training and decision making. What each individual organisation does by way of training and related assessment is unique to each organisation. Local government organisations are operating in blind faith that their preparedness activities are actually enhancing their response and recovery capabilities.

Recommendations for future research and of where emergency managers should direct their attention during preparedness concludes this study. The research community needs to focus attention on local government emergency management and the greater emergency management community needs to support and guide local government emergency management offices.

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LIST OF ABBREVIATIONS

4Rs	Reduction, Readiness, Response, Recovery
AAR	After Action Review
BC	British Columbia
BCERMS	British Columbia Emergency Response Management System
CA	California State, USA
CEG	Coordinating Executive Group
CIMS	Coordinated Incident Management Systems
CO	Colorado State, USA
DHS	Department of Homeland Security (DHS)
ECC	Emergency Co-ordination Centre same as EOC
EM	Emergency Management
EMANZ	Emergency Management Academy of New Zealand
EMO	Emergency Management Office
EMTC	Emergency Management Training Centre
EOC	Emergency Operations Centre (same as ECC)
FEMA	Federal Emergency Management Agency, USA.
GEOC	Group Emergency Operations Centre
HSEEP	Homeland Security Exercise Evaluation Program
ICS	Incident Command System (see also IMS)
IMS	Incident Management System (see also ICS)
MCDEM	Ministry of Civil Defence and Emergency Management
NA	North America
NDM	Naturalistic Decision Making
NGO	Non-Governmental Organizations
NIMS	National Incident Management System
NRF	National Response Framework (USA)
NZ	New Zealand
PEP	Provincial Emergency Program (for British Columbia)

PRFO   Principal Rural Fire Officers

RPD   Recognition Primed Decision Making

RPG   Role-playing game

WA   Washington State, USA

CHAPTER 1:   INTRODUCTION

1.1   RESEARCH OBJECTIVE

This thesis has two research objectives. The first is to conduct preliminary exploratory research about how local government Emergency Operations Centres (EOC)s are used during preparedness activities. The second is to contribute information that could better equip emergency managers to prepare for and respond to emergencies and disasters. This will be done by using both, the literature available and the results of a questionnaire from 48 participating government organisations.

Using the two objectives of this thesis the aim of this study is to guide the direction of future research into the field of local government emergency management. The intention is to discover whether there is a need for more support in the areas of training, assessment, and decision making during EOC activation. A secondary purpose for this thesis is to provide a clear and comprehensive review of the current information surrounding this topic for emergency managers or potential EOC staff involved in emergency management. This thesis also provides supporting information about the emergency management governmental framework of the three participating countries in this study: New Zealand, Canada, and the USA.

1.2   RESEARCH BACKGROUND

Hurricane Katrina, the 9/11 terrorist attacks and the 2004 Asian Tsunami are disasters with catastrophic consequences for humans (Waugh & Streib, 2006). However disasters need not always be disastrous. From each hazardous event, throughout human history humans have adapted. Adapted and learned to better survive the next crisis. There are actions people can take to guard against, to prepare for, respond to, and recover from the impacts of hazards. Emergency management is the practice of these actions. Emergency management is the process designed to help communities prepare for

disasters, to take measures to mitigate the effects of a disaster should one occur, to respond effectively to a disaster and to recover as quickly as possible after the event. Emergency management is about people, people who are affected by the emergency as well as those helping them (Justice Institute of British Columbia [JIBC], 2002).

Paton, Johnston, and Houghton (1998) researched organisational responses to the 1995 eruptions of Mt Ruapehu volcano in New Zealand. Included in their discussion were the implications of the decision-making processes and group dynamics for response effectiveness. They concluded that the effectiveness of the integrated response to the volcanic hazard was muted by communication, co-ordination, training, and organisational constraints. They stated that there was a need to develop inter-organisational networks and the organisational structure, systems, and management capability required for a comprehensive, integrated emergency management system. They also stressed the importance of the development of a team approach, requiring that attention be given to group dynamics and decision-making formats and processes (Paton, Johston, & Houghton, 1998). These discoveries are not unique. Through major events in recent history many other researchers have drawn similar conclusions (Longford, 2008).

The profession of emergency management has changed worldwide since 9/11 and the catastrophic Hurricane Katrina (Waugh & Streib, 2006). The emergency management task environment has become more complex with the increased involvement of law enforcement and national security agencies as well as the addition of terrorist threats (Waugh & Streib, 2006).
According to Waugh and Streib (2006):

> Modern emergency management presents a paradox. On one hand, emergency response requires meticulous organization and planning, but on the other hand, it is spontaneous. Emergency managers have to innovate, adapt, and improvise because plans, regardless of how well done, seldom fit circumstances. Blending these conflicting needs is no easy task. (p. 132)

Emergency management capacity is built from the grass roots level upwards in New Zealand, Canada, and USA similarly (Federal Emergency Management Agency [FEMA],

2008a; JIBC, 2002; Ministry of Civil Defence Emergency Management [MCDEM], 2007). Neighbourhoods and communities need to be self sufficient because assistance may not arrive for hours or days. Major incidents are usually addressed by mutual assistance arrangements among community police, fire, and emergency medical service providers. Local governments have principal responsibility for mitigation and preparedness (FEMA, 2008a). They do this by adopting and enforcing building codes, building standards, and land-use regulations to mitigate water, wind, seismic activity, landslides, and other hazards. Local emergency managers are increasingly collaborating with building code, urban planning, and other officials who can help reduce risks. National agencies also play important roles by providing funding and guidance for public education, alert and warning systems, and evacuation plans, but the tools needed to manage hazards and reduce risks are most often in the hands of local officials (Waugh & Streib, 2006). It is critical to emphasize that all disasters are local events. Natural disasters, technological disasters and terrorist incidents take place within the geography of, or produce consequences within one or more local governments (Perry, 2003).

The focal interest of this thesis is the preparedness activities of local governments. Preparedness is a concept that overarches most aspects of emergency management. It involves coordination between government officials, emergency workers, volunteers, and citizens in the other three phases of emergency management, response, reduction, and recovery. The United State's Federal Emergency Management Agency (FEMA) describes preparedness as: the leadership, training, readiness and exercise support, and 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, Eschelbach, & Brower, 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. This has led to a growing realization that nearly all currently accepted disaster preparedness practices are based largely upon anecdote and are lacking systematic study or objective validation (Thomas et al., 2004).

Complacency with respect to risk reduction and emergency preparedness remains a challenge at national and local levels in New Zealand (Lee, 2010).

A simple summary of the central preparedness concepts is shown in the preparedness cycle in Figure 1 (FEMA, 2010b). This cycle incorporates the planning, training, exercise and evaluation elements discussed in this thesis. "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).

Figure 1: The preparedness cycle, adapted from (FEMA, 2010b)

The rarity of disasters, and thus of opportunities to gain the depth and breadth of experience necessary for effective all-hazards response capability, represents a significant implication for ensuring preparedness. These problems are particularly pronounced with regard to information management and decision making within integrated emergency management operating environments (Paton & Flin, 1999). Local government EOCs present one such environment. EOCs function as the command and communication headquarters for planning and decision-making during a disaster or an emergency. They support operational response implementation undertaken in the field and provide for multiagency coordination. The EOC opens infrequently often in unique and exceptional circumstances. Without preparation this situation can be unfamiliar and

challenging to council employees and other participating agencies unaccustomed to the emergency response environment. There is little social scientific data available to guide emergency managers who must construct, activate, and operate EOCs (Perry, 1995). During the operation of an EOC responding to an emergency it is often required that decisions be made by personnel in the EOC with imperfect data and under considerable time pressure. This situation can be stressful for an unprepared person in the EOC (Paton & Flin, 1999). How decisions are made in this setting are important for the response and recovery of the emergency.

The intent of this study is to collate and communicate information that can provide guidance for decision makers in the EOC environment. Greater enquiry into the field of emergency management, particularly into the way in which emergency managers manage is required (Perry, 1995; Thomas et al., 2004). There is a need to understand human behaviour so as to better coordinate response (Drabek & McEntire, 2003). Drabek's (2003) study of emergency manager's responses to events occurring in 1999 recommended that future research should involve a comparative assessment of EOCs and managerial models across the full range of disasters and community types. The New Zealand Ministry of Civil Defence and Emergency Management (MCDEM) have assessed, following the 2002 implementation of the Civil Defence Emergency Management Act that whilst CDEM Regional Groups can perform well, the performance of individual members varies widely (Lee, 2010). To address these issues MCDEM reports have recommended better leadership, additional resources, and a change in attitude and organisational culture over time (Lee, 2010). The first major assessment of national civil defence emergency management capability since the Act will be completed in 2011, and will indicate New Zealand's disaster resilience (Lee, 2010). This thesis aims to provide a preliminary snap shot of local government organisations in accordance with Drabek's (2003) recommendations. In his study Drabek said that a key lesson from his research was that "Emergency Managers must learn to think strategically" (p. 2). Strategic thinking is intrinsically linked to decision making within the EOC. Therefore what emergency managers may know about decision making during emergency management response is also explored in this study.

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. Recommendations of areas to concentrate on for future research and of where emergency managers need to direct their attention during preparedness concludes this study. In addition New Zealand local government organisations can be compared to some other similar organisations in developed countries. The main reason for involving countries outside of New Zealand is not necessarily to highlight differences but to promote the sharing of successful emergency management practices.

1.3   RESEARCH QUESTIONS

From the research background described above it is evident that there is a need to find out more about what local government organisations are currently preparing for, training for, what exercises they are using, and what role the EOC plays in readiness as well as how often the EOC is activated for response. This thesis presents research that answers seven questions from three inter-related areas of investigation, EOC operation and activation, Emergency management training, and Emergency management decision making.

EOC operation and activation
1.   How often are local government EOCs activated in real emergencies?
2.   How often are these EOCs used in training, exercises, and simulations?

Emergency management training
3.   What role does the EOC play in training, exercises, and simulations and how are these training methods assessed?
4.   Is there a need for more research into how training is assessed and monitored within these organisations?

Emergency management decision making
5.   What is the general understanding of emergency management decision making in local government organisations?

6. What is the perceived understanding of training for emergency management decision making in local government organisations in New Zealand, Canada, and the USA?

7. Is there a need for greater understanding of how emergency managers make decisions and are trained and practice how to make decisions?

1.4 STRUCTURE OF THIS THESIS

This thesis is divided into eight chapters. Within each chapter there are sections divided by sub headings. Chapter 1 is an introduction, Chapters 2, 3 and 4 form the literature review. The literature review chapters are designed to provide the background information that is important for understanding the reasons this research was carried out and for interpreting the results and conclusions that were drawn from this research. The information in these chapters was taken predominantly from recent academic literature and from New Zealand, Canadian and USA government policy, planning and legislative documents. Chapter 5 describes the methodology of the original research part of this thesis and Chapter 6 provides the results from that research. Chapter 7 presents discussion for each of the seven research questions that guided this investigation. Finally Chapter 8 provides recommendations for future research, suggests areas for emergency managers to focus on during preparedness, and concludes the thesis.

CHAPTER 2: EMERGENCY MANAGEMENT

2.1 INTRODUCTION

The major concepts used in the field of emergency management are introduced in the first section of this chapter. Definitions and brief discussion are given for the terms disaster, emergency, hazard, and crisis. Following this, emergency management is defined. The 'All Hazards' approach to emergency management is introduced along with the four phases of the emergency cycle, reduction, readiness, response, and recovery collectively known in New Zealand as the 4Rs. Individual and community vulnerability and resilience are also presented as critical emergency management concepts.

In the second section of this chapter a basic understanding of the emergency management framework of the three countries New Zealand, Canada, and USA involved in this study is outlined. Whilst conducting the research for this thesis it was found helpful to have a clear understanding of the jurisdictional terms each of the countries used to define their territorial boundaries and responsibility delegations. Therefore a section explaining the jurisdictional terminology used by each of these countries has been included. Secondly the organisational framework for each country is explained within the emergency management context. Literature indicates that the emergency management vision, mission, and goals, for New Zealand, Canada, and the USA are similar. While there will be differences between the countries, it is not the purpose of this thesis to provide a detailed analysis of these differences, but to simply ask what is currently being done and observe any notable differences that may be revealed.

The last two sections cover Emergency Operations Centres (EOC)s or the alternately named Emergency Coordination Centres (ECC)s and the incident command system (ICS) or incident management system (IMS). In most cases an adapted version of the ICS is used to organise and manage operations within the activated EOC. The ICS or IMS stem from command and control systems originating from WWII (Handmer, 2008). Some of the conflicting literature of the merits and disadvantages of command and control

systems are presented. The purpose of this thesis is not to dissect the pros and cons of ICSs but to draw attention to discrepancies such as these in order to highlight the need for more research into what works and does not work in local government emergency management.

2.2 DEFINING DISASTERS, EMERGENCIES, HAZARDS, CRISES AND EMERGENCY MANAGEMENT

Before defining emergency management it is important to reach an agreement on the definitions of some of the major descriptive terms used in the field. These include disaster, hazard, emergency, and crisis. There are slight inconsistencies in these terms throughout emergency management literature. The following definitions have been taken from a corroboration of the most recent and widely used emergency management documentation in New Zealand, Canada, and the USA.

Curson (1989) discusses the definition of disaster changing over time from one of a physical phenomenon described in history as an 'act of god' that humans are at the mercy of, to one, more recently that incorporates the social implications of disasters. "People remain the essential reference point for all disasters. It is their vulnerability, misfortune and behaviour that are of central concern" (Curson, 1989, p. 38). These implications are based on demographic, economic, and social vulnerability. Therefore the contemporary definition of disaster is an event that causes significant loss or damage and that overwhelms the capability of the community to manage it. Such an event could require significant additional resources (Ministry of Civil Defence Emergenc Management [MCDEM], 2004). Inversely in the absence of significant loss or overwhelming effect on the community, a disaster has not occurred.

When discussing disasters the differentiation between a disaster and an emergency is important. From an emergency management perspective an 'emergency' is a situation resulting from any happening (natural or otherwise) including, without limitation, any explosion, earthquake, eruption, tsunami, land movement, flood, storm, tornado, cyclone, serious fire, leakage or spillage of any dangerous gas or substance,

technological failure, infestation, plague, epidemic, failure of or disruption to an emergency service or a lifeline utility, or actual or imminent attack or warlike act; and causes or may cause loss of life or injury or illness or distress or in any way endangers the safety of the public or property and cannot be dealt with by emergency services, or otherwise requires a significant and coordinated response under New Zealand's Civil Defence and Emergency Management Act 2002 (MCDEM, 2004). In other words an emergency is a present or imminent event that requires prompt coordination of actions concerning persons or property to protect the health, safety, or welfare of people, or to limit damage to property or the environment (Public Safety Canada, 2010a). An emergency in the emergency management context can be an event that if successfully managed normal community functioning resumes with little or no disruption. In effect a managed emergency is an event on society that is part of life but does not take life or property. Managed poorly an emergency has the potential to escalate into a disaster.

Listed in MCDEM's definition of emergency are some named causes of disasters. These causes are known as hazards. Hazards are something that may cause, or contribute substantially to the cause of, an emergency (MCDEM, 2004). The hazards listed above in the definition of emergency include both man-made hazards, for example war, and natural hazards such as earthquakes. A hazard can also fall between the two types, for example flooding, where man-made structures have contributed to the hazard.

The term 'crisis' is not always used in emergency management legislation or official documents but is often used in academic literature and some researchers make a distinction between crisis and emergencies (Borodzicz & van Harperen, 2002; Smith & Elliott, 2007). In this thesis, crisis will be written interchangeably with 'emergency event' and will be defined as an abnormal and unique event which occurs with some degree of surprise to demand unusual, extensive, and demanding response effort (Kuban, 1996).

While the wording of definitions may differ slightly there appears to be a general consensus throughout New Zealand, Canada, and USA on the meaning of emergency management and the associated terms (Minister of Justice Canada, 2007; Kuban, 1996; Ministry of Civil Defence Emergency Management [MCDEM], 2002; Public Safety

Canada, 2010a; Public Safety Canada, 2010c; Schwab et al., 2007). Emergency management is the universal term for the systems and processes, for mitigating (or reducing), preparing (or readiness) for, responding to, and recovering from emergencies and disasters (JIBC, 2002). It is the application of knowledge, measures, and practices that are necessary or desirable for the safety of the public and property. Emergency management includes but without limitation, the planning, organisation, co-ordination, and implementation of those measures, knowledge, and practices (MCDEM, 2002). It is about people, those who are affected by the emergency as well as those helping to mitigate, prepare for, respond to, and recover from the event (JIBC, 2002).

The *all-hazards* emergency management approach using a four phase emergency management cycle is consistent across Canada, USA, and New Zealand. All-hazards means a holistic approach to managing hazards is taken covering all of the different types of natural or man-made hazards that could possibly affect the area, either known hazards or unknown hazards (MCDEM, 2007). The four phases of emergency management are reduction, readiness, response, and recovery (MCDEM, 2007). In some emergency management plans or frameworks reduction is called mitigation and readiness is called preparedness. The terms mean the same and will be used interchangeably. Reduction is the identification and analysis of long-term risks to human life and property from hazards. 'Reduction' involves eliminating risks if possible or reducing the magnitude of their impact or the likelihood of their occurrence. **'Readiness'** refers to the development of operational systems and capabilities before a civil defence emergency happens. This includes self-help and response programmes for the general public, and specific programmes for emergency services, lifeline utilities and other agencies. 'Response' is the action taken immediately before, during, and after a civil defence emergency to save lives and protect property, and to help communities recover. 'Recovery' is the co-ordinated efforts and processes to bring about the immediate medium-term and long-term regeneration of a community following a civil defence emergency. These are often referred to collectively as the 4Rs and make up an all-hazards integrated approach to emergency management (Alexander, 2003; Becker & Saunders, 2007; MCDEM, 2007).

The vision for Civil Defence and Emergency Management (CDEM) in New Zealand is *"Resilient New Zealand: communities understanding and managing their hazards"*. How this vision is to be achieved is outlined in the New Zealand National CDEM Strategy derived from the CDEM Act. Resilient communities are communities that take action prior to a hazard event so that a disaster does not eventuate. Preparedness and mitigation are the two phases that feature most prominently in building community resilience before an event occurs (Schwab et al., 2007). Emphasis is placed on this strategy as being for all New Zealanders and requires all to participate. This includes all of the Government levels, local authorities, individual departments, business, volunteer organizations, right down to families and individuals. Local and regional cooperation and coordination in particular is paramount and is one of the cornerstones of the Act.

Resilience and vulnerability are important elements in the interaction between communities and hazards. Vulnerability is the combination of characteristics of a person or group in terms of their capacity to anticipate, resist, cope with, and recover from the impact of a hazard (Blaikie, Cannon, Davis, & Wisner, 1994). Resilience is the active purpose of self-righting. High individual resiliency is learned resourcefulness and growth, and the ability to function psychologically at a level greater than expected given the individuals known capabilities and previous experiences (Paton, Smith, & Violanti, 2000). Community or social resilience is the capacity of a social entity (e.g. a group, or community) to 'bounce back' or respond positively to adversity (Maguire & Hagan, 2007). A resilient community predicts and anticipates disasters; absorbs, responds and recovers from the shock; and improvises and innovates whereas a vulnerable community will suffer greater negative impacts in response to disasters (Paton, 2006). In this thesis resiliency in the individual, particularly in emergency managers and those working within an EOC will be discussed. Community resilience will also be relevant in discussion surrounding the ways to enhance EOC preparedness.

2.3   THE EMERGENCY MANAGEMENT FRAMEWORK IN NEW ZEALAND, BRITISH COLUMBIA CANADA, AND THE USA

During an emergency event all types of organizations must share tasks and resources. Often there is no clear cut responsibility or familiarity due to the crossing of jurisdictional boundaries and absence of standardization (Auf der Heide, 1989).There is a need for communities to develop on-going planning strategies that encompass all aspects of the hazard problem, including social and political elements (Tobin, 1999). In this section these elements and the planning frameworks currently in place in the three countries involved in this study are briefly outlined.

The vision, mission, and goals found in the Emergency Management strategic plans for many developed nations including New Zealand, Canada, and the USA are similar, if not identical in places (FEMA, 2008a; JIBC, 2002; MCDEM, 2007). As with New Zealand, Canada and the USA's emergency management model is based on the all-hazards approach which requires everyone from individuals and families to the federal government to engage in emergency management for a broad range of hazards (FEMA, 2008a; JIBC, 2002; MCDEM, 2007). While differences may exist between the countries used in the research for this study, it is not the primary objective of this study to identify and exploit these differences. In general, the countries are of similar emergency management origin, values, and goals and the sharing of different practices and ideas throughout the emergency management community should be encouraged.

A brief overview of the emergency management framework for New Zealand, Canada, and the USA is given in the next sections with slightly more emphasis given to New Zealand. Some key government organisations will also be introduced. The aim of this section is to provide a general understanding of how these countries are organised in relation to their emergency management responsibilities. First the jurisdictional terminology used when discussing the different territories in each of the countries will be explained.

2.3.1 Jurisdictional terms

Each country has its own unique set of terms and organisation for its land areas and governance. Canada and the USA have a three level government system, federal, state or province[1], and local (Affordable Housing Institute [AHI], 2011). Their national government is the federal government that is further divided into 'provinces' or 'territories' for Canada or 'states' for the USA. The local levels are the regional districts in Canada and counties in the USA which, for both countries are further divided into municipalities (AHI, 2011; Government of British Columbia, 2011; Public Safety Canada, 2010a). Lacking states or provinces, New Zealand has a two level system of national and local government. Confusion can occur here, as the NZ local government is made up of regional councils which serve to govern or support the city or district councils and often it is these *local authorities* that are referred to as the local council (Local Government New Zealand [LGNZ], 2011).

The terms that will be used for the national level of governance will be either central or national government and includes where relevant (for Canada and the USA) federal government. Examples of lead agencies for central government emergency management are the Ministry of Civil Defence and Emergency Management (MCDEM) in New Zealand; Public Safety Canada (Canada's national emergency management agency); and the Federal Emergency Management Agency (FEMA) for the USA. Beneath the central government is the state or provincial level of governance, examples are the Provincial Emergency Program (PEP) for British Columbia, and the Washington State Emergency Management Office for WA, USA. New Zealand does not have this level of governance. The local government level in New Zealand includes the regional councils for example Horizons, (the Manawatu Regional Council) and the local authorities made up of city or district councils for example the Christchurch City Council. In Canada and the USA the local level is usually referred to as municipalities which are made up of cities, towns,

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[1] There are also areas in Canada at this level called 'territories' (for example the Northwest Territories) as well as Provinces. This thesis includes only British Columbia which is a province so territories will not be discussed further.

villages, or districts depending on the population. Examples are the Nanaimo Regional District in British Columbia and the Delta County Office of Emergency Management in CO, USA. The summary in **Table 1** and the following sections will clarify the jurisdictions for each of the countries further (FEMA, 2008a; Government of British Columbia, 2010; Government of British Columbia, 2011; LGNZ, 2011; Ministry of Civil Defence Emergency Management [MCDEM], 2006b; Public Safety Canada, 2010a; Public Safety Canada, 2010c).

Table 1: Different levels of government, terminology, and examples of departmental organisations for each of the three countries used in the research for this thesis				
Country	National or central government	State/Provincial Government	Local Government	
			Regional Government	Local Authorities/ Municipalities
New Zealand	National Government, e.g. MCDEM	None	Regional Council, e.g. Horizons, the Manawatu Regional Council	City or district council, e.g. Christchurch City Council
Canada, BC	Federal Government, e.g. Public Safety Canada	Provinces or Territories, e.g. Provincial Emergency Program for British Columbia	Regional Districts, e.g. Nanaimo Regional District	Municipalities (city, town, village, district), e.g. Nanaimo City
USA, CA CO WA	Federal Government, e.g. FEMA	States, e.g. Washington State Emergency Management Office	Counties, e.g. Delta County Office of Emergency Management	Municipalities (city, town), e.g. City of Delta

2.3.2 New Zealand

The Civil Defence Emergency Management Act 2002 (CDEM Act) and its supporting documents identify the statutory powers, structures, and arrangements that government use to manage an emergency. Figure 2 shows the overarching CDEM legislative framework. This comprises of the CDEM Act, the National CDEM Strategy that establishes the vision of a 'Resilient New Zealand', the National CDEM Plan that aims to integrate and align agencies CDEM planning and related operational activities at the national level and the Guide to the National CDEM Plan that sets out the high-level operational arrangements of core CDEM organisations in the public and private sectors. There are 16 Group arrangements for each of the local regions within New Zealand (MCDEM, 2010b; Lee, 2010).

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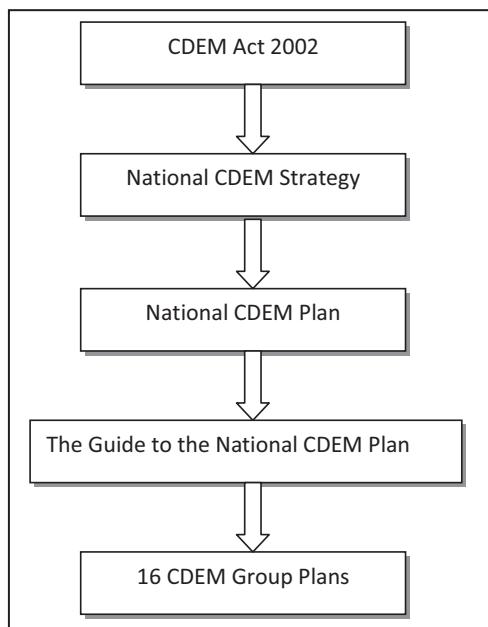
Figure 2: *The New Zealand CDEM legislative framework (Lee, 2010)*

The CDEM Act places obligations on agencies to prepare for and manage emergencies effectively and efficiently. Central government, along with national professional bodies and organisations, provide guidance to practitioners working within different sectors, and information to the public. The Government also establishes priorities for and funds research into hazards and risks to guide informed decisions. MCDEM would be the led agency in the management of a 'state of national emergency' or in supporting an emergency of 'national significance' under the CDEM Act (Ministry of Civil Defence Emergency Management [MCDEM], 2006b). However, most hazard events occur at the local or regional level. Even large events consist of many, small incidents that together give the event its scale (MCDEM, 2006b). Therefore the majority of emergency management coordination is carried out by staff from the local councils. There are often members of other organisations present but the chief decision makers are usually managers from these councils.

The New Zealand multi-level response structure is shown in Figure 3. 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 involve the Ministry of CDEM in Wellington, the National Crisis Management Centre

(NCMC). 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 (Emergency Management Training Centre [EMTC] 2008). These command and control management structures and EOCs will be defined and discussed later in this chapter.

Figure 3: Levels of response coordination (EMCT, 2008)

The focus of the information presented in this thesis is predominantly concerned with levels 3 and 4; readiness and response at the local and regional levels. New Zealand has 12 regional councils, 57 district councils, and 16 city councils (Lee, 2010). At level 4 the regional coordination level is often referred to as the *'Group Level'*. CDEM Groups are formed from local authorities that work together and with other organisations to provide coordinated CDEM planning for reduction, readiness, response, and recovery in that region. CDEM Groups and each of their members, the local authorities, are required to provide for the planning, organisation, co-ordination and implementation of comprehensive civil defence emergency management within their CDEM Group and

their respective local authority areas (MCDEM, 2006b). These local authority areas are often the district or city councils, (represented as level 3 in Figure 3).

The relationships between the major emergency management organisations are represented in Figure 4 adapted from *The Guide to the National CDEM Plan*. Figure 4 shows the key relationships of CDEM Groups and plans. This diagram fits with the levels represented in Figure 3. The National CDEM Plan corresponds with national coordination at level 5 in Figure 3, the *CDEM Group Plans* guide the regional response organisations at level 4, and the local arrangements guide the local authorities at level 3. As mentioned above levels 1 and 2 use CIMS as their action plan. The CDEM Group structure is shown in Figure 5. The administering authorities are the city, district, and regional councils which support and provide the resources for other regional based groups which in turn manage the EOC which is the direct connection to the community during response activities. The shaded elements in Figure 5 show the organisations of interest in this study. In addition there are community specialist groups contributing to the EOC on one side and the CDEM plans (such as those shown in Figure 4) on the other side. Also included in Figure 5 are the 4Rs, shown in relation to the community emergency management priorities[2].

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[2] For more information regarding the New Zealand Emergency Management Framework see the MCDEM National legislation; The CDEM Act 2002, The National CDEM Plan, and The National CDEM Strategy and The Guide to the National CDEM Plan. The individual group plans can also be found through the MCDEM web site http://www.civildefence.govt.nz.

Local	Local Organisation	Local Authorities	Local Department	Local	Level 3
CDEM Group	Regional Organisation	Ministry of Civil Defence	Regional Department	CDEM Group	Level 4
National CDEM	National Organisation	Ministry of Civil Defence	Government Departments	National CDEM	Level 5

Minister of Civil Defence / Cabinet
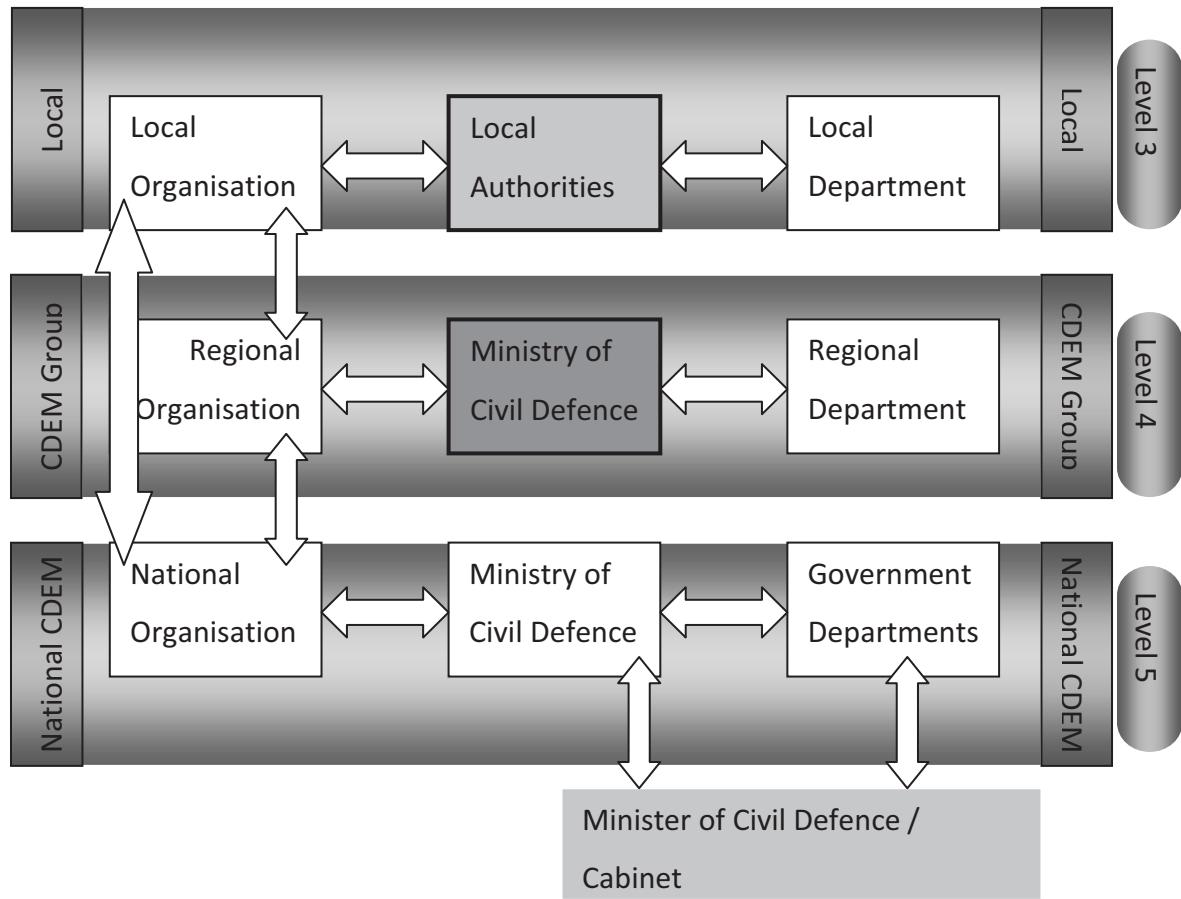
Figure 4: *Key Relationships of CDEM Groups and Plans adapted from the MCDEM Guide to the National Plan (2006b). The level 3, 4 and 5 tags on the right have been added and correlate with Figure 3.*

Communities

Emergency readiness, response, & recovery activities

Community Group Participants

Emergency services

Lifeline utilities

Central govt. agencies

Researchers

NGOs

Volunteer groups

Emergency Operations Centre(s)

CDEM Group Emergency Management Office

Coordinating Executive Group (CEG)

CDEM Group

Work to

Produce services/products

Administer

Tasking

Guides

Set

Approves

Provide resources

CDEM Plan Provides:

Strategic direction

Goals, context and criteria

Hazards and consequences

Operational arrangements

Roles, tasks, and resources

Hazard and risk reduction

Administering authority

Constituent local authorities: regional council, city and district

Figure 5: CDEM Group structure adapted from the MCDEM Guide to the National Plan (2006b).

2.3.3 British Columbia (BC), Canada

Canada is a federal state wherein the power to govern is divided between a central authority (the federal government) and a group of regional authorities which may collectively be referred to as provincial governments. A province or territory may delegate to municipalities any or all of its powers with respect to fire and emergency services (Kuban, 1996). The local government system in British Columbia (BC) is comprised of regional districts and municipalities. Municipalities, along with non-municipal areas form part of the regional district system (Government of British Columbia [BC], 2010). Provincial legislation delegates to British Columbian municipalities a variety of powers for the establishment and operation of fire and emergency services which include the power to enact by-laws for fire and emergency purposes (Government of British Columbia [BC], 2011). The populations of the 160 municipalities in BC range in size from small villages of fewer than 250 persons to large cities approaching 600,000. The median population size is 4,800. While municipalities cover only 1% of BC's terrain they serve about 87% of the population. They range in geographic size from 60 hectares to 155,000 hectares. There are four classes of municipalities: village, town, district, and city. These definitions are population-based but the authorities of each class are the same (Government of BC, 2010).

The dominant federal organisation for emergency management in Canada is Public Safety Canada. It develops national policy, response systems, and standards. It also works closely with emergency management organizations across Canada and support regional partners and first responders with funds, tools, and training. Public Safety Canada houses the Government Operations Centre at the hub of the national emergency management system. It's an advanced centre for monitoring and coordinating the federal response to an emergency (Public Safety Canada, 2010b).

At the provincial level in BC the Provincial Emergency Program (PEP) provides the majority of emergency management policy, planning, direction, and support for its local level emergency offices. The PEP is part of the Ministry of Public Safety and Solicitor General of the Government of BC. Its mission is to enhance public safety and reduce

property and economic loss from actual or imminent emergencies or disasters by mitigating the effects of emergencies or disasters through education and awareness, promoting preparation through planning, training and exercising, coordinating and assisting in response activities, developing and implementing recovery measures. The PEP works with local governments year round, providing training and support before, during, and after emergencies (Ministry of Public Safety and Solicitor General, 2010).

2.3.4 USA

Under the American system of governance, the states act as sovereign units, except for certain enumerated powers, including interstate commerce, security of the homeland, and foreign affairs, which are delegated by The Constitution to the national government. The levels of governance are, federal, state and local, as well as regional (Affordable Housing Institute [AHI], 2011).

FEMA and the National Emergency Management Agency (NEMA) are the USA's national emergency management organisations. FEMA's mission is to coordinate and provide the core federal disaster response capability needed to save lives, reduce suffering, and protect property in communities throughout the Nation that have been overwhelmed by the impact of a major disaster or emergency, regardless of cause (FEMA, 2008a). The majority of federal government involvement consists of intergovernmental programmes, particularly through government appropriations (such as grants and aid awarded to state and local governments) (Schwab et al., 2007). The federal government secures cooperation of the state and local governments through the imposition of rules and criteria that apply to the use of these funds. In this way the federal government holds a degree of leverage over activities that would otherwise be entirely within the domain of state and local governments. Many of the largest grants and packages are for post-disaster assistance. The federal government is also a significant owner of land holdings through which it can control land use (Schwab et al., 2007). Within FEMA's organisational structure there are 10 standard Federal regions that support ten different areas of the United States, each division is named Region (i – x). Region X for example is the FEMA department that covers Alaska, Idaho, Oregon, and Washington States.

NEMA is the professional association of and for emergency management directors from all 50 states, eight territories, and the District of Columbia. They provide national leadership and expertise in comprehensive emergency management; serve as a vital emergency management information and assistance resource for emergency managers; and advance continuous improvement in emergency management through strategic partnerships, innovative programmes, and collaborative policy positions (National Emergency Management Agency [NEMA], 2010).

At the state level, by the virtue of the Tenth Amendment to the United States Constitution, state governments possess inherent power (called The Police Power) to enact responsible legislation to protect the health, safety, and general welfare of the public. With no overriding public policy regarding how to mitigate for hazards the states have derived their own diverse methods of protection. Some states are quite involved while others have delegated responsibility to the local governments and some local governments require the implementation of decisions to be made at the community level. "This inconsistency reflects the fact that the states vary widely in their hazard experiences as well as their political, fiscal, and technical ability to deal with those hazards" (Schwab et al., 2007, p. 155). The state has the ability to delegate some of their police power to the local governments. This derivative authority varies widely from state to state but most local governments are given a fair amount of autonomy to enforce their police power, particularly with regard to emergency management (Schwab et al., 2007).

The basic types of local government in the USA are counties, municipalities, towns, and townships. Regions also exist but are often based on ecosystem boundaries and are multi-jurisdictional collaborations. Regionalism is not widely used in the United States as a way of policy setting or enacting regulation, and none have yet been established for hazard mitigation purposes (Schwab et al., 2007). Almost all states (including CA, CO and WA) are divided into counties which are an administrative unit of the state for activities of state-wide concern at the local level and often have policy and decision making responsibilities. Municipalities are also general-purpose incorporated units of

government, formed by the state through charter or other means (Schwab et al., 2007). In all states municipalities are authorised to make decisions for the community and to implement policies and programmes that fall within their delegated powers and responsibilities. Unlike counties they generally have greater decision making authority and discretion. Towns and townships are units of government distinct from counties and municipalities. Some have considerable ownership and broad powers and some (usually those that are more rural) have more limited authority. Local governments represent only one of the many layers of emergency management in the USA but they are arguably the most critical for creating resilient communities. At the local level land use patterns are determined, infrastructure is designed, and other developmental issues are decided (Schwab et al., 2007).

2.4   EMERGENCY OPERATIONS CENTRES (EOC)S AND EMERGENCY COORDINATION CENTRES (ECC)S

Emergency Operations Centres (EOCs) or Emergency Coordination Centres (ECCs)[3] function as the command and communication headquarters for planning and decision-making during a disaster or an emergency. They support operational response implementation undertaken in the field and provide for multiagency coordination. The EOC concept allows for interpersonal communication, technically supported information exchange, and decision-making among the representatives of different agencies, who are in turn communicating with their personnel either at the scene of an emergency or elsewhere in their respective organisations (Kendra & 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

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[3] 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 thesis EOC will be the term used to describe either an EOC or ECC.

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 can also be mobile units with some organisations using custom made trailers, or set up in temporary or semi-permanent locations as the circumstances of the emergency dictate (Kendra & Wachtendorf, 2003). EOCs are not fully staffed at all times; rather, they are activated only when an event crosses or might cross a certain magnitude threshold requiring a multi-agency response. 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 (Kendra & Wachtendorf, 2003).

EOCs are expected to have multi-hazard response capabilities, ensuring the ability to cope with a variety of disaster types (Kendra & Wachtendorf, 2003). At the EOC, representatives from organisations crucial to response efforts interpret information gathered from the remote locations of the emergency sites and from outside sources. They achieve this using intelligence such as satellite data, weather reports, resource inventories, health and safety statistics and news accounts in order to understand and coordinate the disparate, shifting elements of an evolving dynamic situation and to mount an effective response through mobilising the assets of many branches of government (Kendra & Wachtendorf, 2003).

In New Zealand, city, district, and regional councils are required under the CDEM Act to be able to open and operate an EOC. In some cases for small city and districts the regional council undertakes this responsibility on their behalf. Canada and the USA follow a similar emergency management framework, where the majority of emergency information and coordination is processed at the local level EOC (Perry, 1995). The amount of involvement of a higher level government EOC depends on the scale and nature of the incident. It is usually the EOC at the local level that acts as an over-arching organization into which information from more specialized 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 organizations who respond to the disaster event. There is 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 organizations that manage victim sheltering and welfare) and representatives of organizations associated with higher levels of government from the county, state, and or central offices. The organizations 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). For example during a pandemic response the health department would have a high level of involvement in the EOC, but may only have limited representation during a severe weather response.

EOCs are nested within one another with the objective of regularizing or making explicit communication and action links in the municipal chain of command (Perry, 1995). During an event in a given area numerous EOCs may operate. In large municipalities, fire and police departments operate their own EOCs; sometimes these units are based in routine despatch areas (Perry, 1995). It is also common for public works or transportation departments to maintain EOCs. These can be called departmental EOCs. The distinction between departmental EOCs and municipal (or local) EOCs is that departmental EOCs focus on the management of the response behaviour of the single organization they represent using their own operating procedures and despatch their own personnel and resources. A municipal EOC would direct response policy and operational assignments. Ideally departmental EOCs would have representatives at the municipal EOC who serve as communication liaison for their respective agencies. Thus, there are layers of EOCs within any particular municipality (or within any higher level of government) (Perry, 1995). For example a flood within a local authority area may require the local city council's EOC to open. If the flooding spreads affecting a wider area the regional council may open to support the city council. Or in situations where the district or city council does not have EOC capabilities the regional council operates an EOC on their behalf. An emergency affecting the greater part of the region, for example widespread extreme weather would also necessitate the activation of the Regional EOC (EMTC, 2008).

2.5   INCIDENT COMMAND SYSTEMS (ICS) AND INCIDENT MANAGEMENT SYSTEMS (IMS)

The incident command system (ICS) or Incident management system (IMS) is utilized as a command and control management resource for disasters[4]. There are many approaches to, and names for ICS, but all have in common the notion of coordinating the actions necessary to manage disasters and emergencies (Perry, 2003). The critical tasks leading up to, during, and following a disaster involve coordinating multi organizational, intergovernmental, and inter-sector response and recovery operations. In the early 1970s, because of coordination problems during large California wildfires, the ICS was created to integrate and coordinate fire operations involving multiple departments (Waugh & Streib, 2006). 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 & Myers, 2004). According to the Emergency Management Division of the Justice Institute of BC (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 following basic structure to coordinate response activities: management, operations, planning, logistics, and finance/administration (JIBC, 2002).

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), British Columbia in Canada has the British Columbian Emergency Response Management System, (BCERMS), the USA has the National Incident Management System (NIMS)

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

(EMTC, 2008; Feral Emergency Managment Authority [FEMA], 2008b; Iannella & Henricksen, 2007).

The New Zealand ICS, CIMS does not necessarily cover the control or coordination for functions higher than at an incident coordination level (EMTC, 2008). EOC training is offered by the Emergency Management Training Centre (EMCT) that 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. However EMTC's approach to training is only one example of the various different training courses offered for emergency management in New Zealand[5].

In the USA the National Response Framework (NRF) presents the guiding principles that enable all response partners to prepare for and provide a unified national response to disasters and emergencies. It establishes a comprehensive, national, all-hazards approach to domestic incident response (Department of Homeland Security [DHS], 2008). NIMS works hand in hand with the NRF. NIMS provides the template for the management of incidents, while the NRF provides the structure and mechanisms for national-level policy for incident management (FEMA, 2008b). NIMS, presents a consistent nationwide template to enable federal, state, tribal, and local governments, non-governmental organizations (NGOs), and the private sector to work together to prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity (FEMA, 2008b).

Within emergency management research literature there is surmounting debate over command and control systems such as CIMS, NIMS and BCERMS, particularly for use in large scale emergency events and disasters. It is not the objective of this thesis to

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[5] During the research for this thesis, it was found that EOC training is not standard across New Zealand and that EMCT's approach may not necessarily apply to EOCs across the country.

present a detailed argument of command and control systems. Presenting some of the conflicting discussion surrounding this subject highlights the need for further research into understanding the merits and drawbacks of how command and control is currently used in EOCs.

Although command and control structures are important, the emergency management departments also needs to have more flexible and more nimble processes to ensure that it can adjust to changing circumstances (Waugh & Streib, 2006). Drabek and McEntire (2003) 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, and weak methodology and that these problems have led to incorrect assumptions, misguided conclusions and the possibility of detrimental consequences. They conclude by stating that command and control systems currently in use by government organisations are strict, rigid, and centralized. 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 decentralization 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, Trainor, and Aguirre (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. Their aim was to illuminate the general limitations of the approach as an all-encompassing model for disaster-related organizational and inter-organizational 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.

2.6   CONCLUSION

In this chapter the broad concepts and common terminology of contemporary emergency management were introduced along with the three countries, New Zealand, Canada, and the USA involved in this study. The chapter provided information about the jurisdictional terminology, frameworks, and, the major emergency management organisations for each of these countries. Attention was drawn to the importance of the role that local governments play in managing emergencies and disasters. In conclusion it is therefore important to research what the current involvement, practices, and perceptions of emergency management are within these organisations.

The EOC function and place within emergency management was introduced. Throughout this thesis the local government EOC will be returned to in discussion as a central theme. The ICS is the dominant system for organising and managing within the operating EOC. This system could potentially be both advantageous and disadvantageous. On one hand it provides a common management system for all agencies to follow, but on the other it can also hinder operations during a fast paced response.

There appears to be minimal research available of the command and control system specifically used in local government EOCs. Some examples of command and control research used in other areas of emergency management show conflicting ideas surrounding this subject. More research into ICSs within activated EOCs is required before any definitive answers can be given about the merits of its use in the EOC.

CHAPTER 3: EMERGENCY MANAGEMENT TRAINING

3.1 INTRODUCTION

"The most important principle of good disaster preparedness planning is that it must include training as a key component" (Quarantelli, 1985, p. 25).

In the previous chapter the general terms and principles of emergency management were introduced. Of these, planning features prominently as part of preparedness. But the crisis management of disasters does not follow automatically from disaster planning (Quarantelli, 1988). Training provides the bridge between the planning and the actual response during crisis. Fundamental to disaster readiness planning is developing training strategies to compensate for the limited opportunities available for acquiring actual disaster response experience (Paton & Jackson, 2002).

This chapter begins by defining emergency management training and a basic training schematic is presented that shows training as a process. This process at first requires gaining an understanding of who needs to be trained, the method of training chosen, and the adequate preparation to be conducted. The training is then to be delivered, evaluated, and finally modified for future use if required. The following section discusses the use of exercises as part of training and for testing procedures and plans. Most industrialised countries regard the use of exercises as an essential part of preparedness and often have mandates ensuring its inclusion into preparation activities (McEntire & Myers, 2004). In New Zealand MCDEM stipulates the establishment of such a programme and this programme is outlined in this chapter. MCDEM uses an exercise cycle with similar principles to the training schematic presented earlier in the chapter. As with the training schematic this cycle stresses the importance of process including feedback from evaluations. The most common types of exercise; orientation, tabletop, drills, functional, and full scale exercises found in emergency management are introduced.

The next section covers the assessment of training and exercising. Assessment is the monitoring and evaluation of training and exercises, these terms are defined and discussed. Some of the methods used for assessment are described. Lastly this chapter presents a section on the implications using and assessing exercises. Particular focus is on how to measure the effectiveness of exercises. The aim of this thesis is not to provide a detailed analysis of whether exercises work effectively or not, but to provide the background information that will aid in the interpretation of the results of what exercises are currently used in local government EOCs and how these exercises are assessed.

3.2   DEFINING TRAINING

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 & Peterson, 1999). 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. Training should incorporate key officials and must focus on the procedures that will take place in the EOC (McEntire & Myers, 2004).

Training is the systematic acquisition of knowledge, skills, and attitudes with the goal of developing competencies necessary for effective performance in work environments (Salas, Priest, Wilson, & Burke, 2006). The quality of response and recovery efforts is directly linked to the knowledge and skills possessed by staff working at disaster sites (Schaafstal, Johnston, & Oser, 2001). Training requires novel inter-organisational collaboration. Operational effectiveness relies on mental models (explained in more detail in the next chapter) typically derived from actual emergency experience (Flin, 1996). But opportunity to obtain this experience is limited by the rarity and unexpectedness of these events. Training is expensive both in finance and time and with limited resources. It is therefore essential that the training event delivers effective learning (Wilson, 2000).

Wilson's (2000) basic training schematic provides a good introduction into what is required of a comprehensive training programme. This schematic presents the general process of training to the point of uncovering who needs to be trained and in what topics. He emphasises that it is important to understand that people learn in different ways. Effective response to a crisis event requires those with responsibility to take into account both the training requirements of the responders and the maximisation of their learning. Wilson's seven steps ensure these bases are covered.

Wilson's (2002) Basic training schematic:
1. Identify the training needs
2. Identify those who need training
3. Identify the training method to be used
4. Prepare the training materials
5. Deliver the training programme
6. Evaluate the effectiveness
7. Audit the process for future modification

3.3   EXERCISES

"Most industrialized countries have mandates concerning exercises, which underscore the view that such drills are essential to the preparedness process." (McEntire & 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 (Ministry of Civil Defence Emergency Management [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 & van Harperen, 2002). 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 & Peterson, 1999; Trinka & 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 & Jenvald, 2006, p. 219).

Simulated crisis scenarios are frequently cited as effective tools for organisational and individual learning (Borodzicz & 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. 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, Donovan, & Pettitt, 2003).

3.3.1 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.

Orientation

This type of exercise is used to familiarise the players with an activity. It could be in the form of a lecture, seminar, or discussion. It can also be referred to as a '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 (Green, 2000; MCDEM, 2009).

Tabletop

A tabletop exercise may also be referred to as a discussion exercise. It is a seminar type discussion with problems interjected by message. Participants are presented with a situation or problem that they are required to discuss and 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).

Drill

A drill is an exercise where staff physically handle specialised equipment or perform a specific procedure. The exercise usually has a time frame element and is used to test procedures (Green, 2000; MCDEM, 2009).

Functional

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).

Full scale exercise

A full scale exercise may also be referred to as a 'practical' or 'field' exercise. These include the movement or deployment of people and resources to include physical response 'on the ground' to a simulated situation. They can be 'ground' focused only or may include the higher level response structures, and 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 (Green, 2000; MCDEM, 2009; Perry, 2004).

3.3.2 The exercise cycle

According to MCDEM the success of individual exercises relies on the execution of four distinct stages, which are collectively known as the exercise development cycle illustrated in Figure 6. These stages are, analyse the need, design the exercise, conduct the exercise, and evaluate the exercise. This cycle presented in MCDEM's Directors Guide to Exercises is compatible with Wilson's (2000) schematic for training introduced earlier in this chapter. Similarly the exercise cycle is a process whereby failures at any one stage may impact on the effectiveness of the exercise. FEMA has also produced a similar resource for exercise planning called the Homeland Security Exercise and Evaluation Program (HSEEP). It provides standardized methodology and terminology for exercise design, development, conduct, evaluation, and improvement planning. It constitutes a national standard for all exercises. Through exercises, the National Exercise Program supports organizations to achieve objective assessments of their capabilities so that strengths and areas for improvement are identified, corrected, and shared as appropriate prior to a real incident (Federal Emergency Management Authority [FEMA], 2010a).
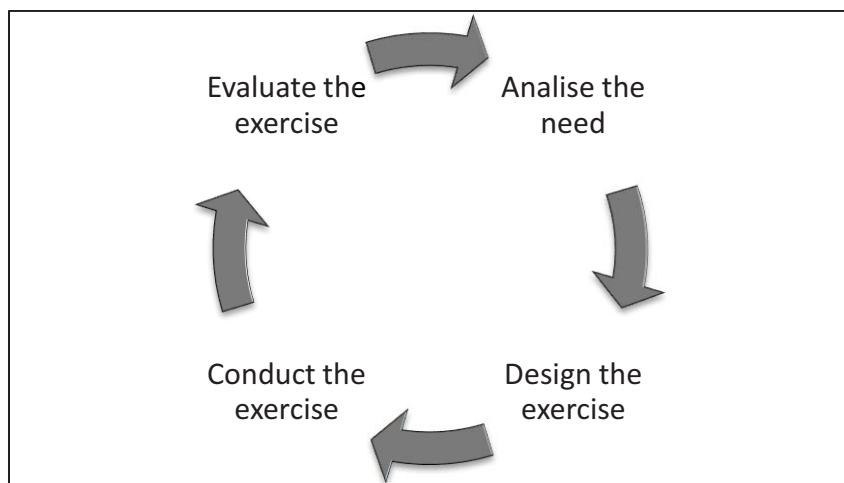
Figure 6: Exercise development cycle ((MCDEM, 2009, p. 10)

New Zealand's National CDEM Plan also 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 (MCDEM, 2009). 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.

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)

3.4 TRAINING ASSESSMENT: MONITORING AND EVALUATION

The main objectives of monitoring and evaluation are to enhance organisational learning, ensure informed decision-making, support substantive accountability, and build capacity and capability. These objectives are linked together in a continuous process. Learning from experience results in more informed decision-making; better

decisions lead to greater accountability to stakeholders; all three elements working together make a positive contribution to overall emergency management effectiveness (Borodzicz & van Harperen, 2002; Ministry of Civil Defence Emergency Management [MCDEM], 2010a). Basically training and exercises need to be assesses to ensure the objectives of the training have been met and to identify improvements needed in an agency, process or function (MCDEM, 2009).

Shown in both, the training schematic, and the exercise cycle, assessment, monitoring and evaluation are essential parts of the training or exercise process. Assessment includes the two linked but quite different concepts; monitoring and evaluation.

> Monitoring is a continual process that aims to provide management and stakeholders of an ongoing intervention with early indications of compliance with responsibilities, and progress, or lack thereof, in the achievement of results. Evaluation is about measuring effectiveness. It compares what is happening against what was intended (goals, objectives, and targets) and interpreting the reasons for any differences." (MCDEM, 2010a, p. sheet 2)

The assessment of training and exercises is not to be confused with the overall assessment of response capabilities of an organisation. Mentioned earlier in this chapter the exercises themselves can be used as a means of testing and evaluating plans or training. However the exercise itself also needs to be evaluated to complete the exercise cycle. To clarify, if the exercise is being used to test an emergency plan this needs to be stated as a goal or objective of the exercise, and included during the analysis of needs stage of the cycle. Then the final evaluation stage must take into account whether the objective has been met or not. This is no easy task and there is limited research available that provides results of effectiveness of exercises used involving local government EOCs. Emergency management exercises and crisis simulations are somewhat unique in that effectiveness cannot be gauged against other modes of training (Borodzicz & van Harperen, 2002). For those wishing to evaluate crisis simulations, it is unlikely that the teams trained will ever be used in the same format to manage a real crisis and the nature of crisis response makes it hard to measure (Borodzicz & van Harperen, 2002).

3.4.1 Methods of assessment

MCDEM produced a set of exercise guidelines for emergency management groups. These guidelines stress the importance of evaluation and provide a section including directions for a variety of debriefing methods for evaluation (Ministry of Civil Defence Emergency Management [MCDEM], 2006a). Debriefing appears to be the most popular method of assessment. MCDEM also have a set of Debriefing Guidelines that aims to guide emergency management staff through the debriefing process prior to and post emergencies, disasters and exercises. A post exercise debrief is defined as a critical review of the entire exercise and it identifies those areas that were handled well, those areas where issues were experienced and identifies recommendations for improvement (MCDEM, 2009). Debriefing methods can be used to provide participants with feedback to increase self awareness, reflect on the scenario providing an opportunity to learn from experience (Borodzicz & van Harperen, 2002). A debrief is run by an experienced facilitator to determine what went right, what went wrong and why, without trying to lay blame. Specific questions which arise from the achievement or non achievement of objectives are recorded, good performance is acknowledged, and constructive information from those being debriefed is sort. There is focus on improving procedures and training, and on summarising key points and suggestions for follow-up action. All relevant information is recorded to enable reports to be compiled (MCDEM, 2006a).

There are usually two debriefs conducted after an exercise a hot debrief and a cold debrief. A hot debrief is held immediately after an exercise. It is an opportunity for all participants to provide feedback while the exercise is still fresh in their minds. A cold debrief is a more formal debrief held within four to six weeks following the exercise. This debriefing process should remain focused on evaluating the exercise's effectiveness and on issues, successes, and problems (MCDEM, 2009). Within the realm of the cold debrief there is also an internal organisational debrief that involves just one organisation and focuses on internal operations and a multi-agency debrief that focuses on the effectiveness of inter-agency coordination (MCDEM, 2006a). It is argued by Thiagarajan (1993) that a structured form of debriefing, using a standard set of questions, appears more effective. He suggests some examples of ways to debrief are guided, mediated,

and video supported debriefing, debrief games, journal writing, questionnaires, panel discussions, and dialogues (as cited in Borodzicz & van Harperen, 2002).

Paton and Jackson (2002) suggest an alternative means of facilitating the development and maintenance of emergency management competencies by the use of an assessment centre as a training and development resource. The term 'assessment centre' may be misleading as it refers more to an event than a place. Assessment centres involve participation in multiple exercises and simulations, and the observation and evaluation of performance against predetermined task-related behaviours by a team of trained assessors (Ballantyne & Povah, 2004). Assessment centres can allow both specific aspects of complex and multi-faceted emergency management roles and tasks to be developed and practised individually and, by using multiple exercises and simulations, provide an opportunity for participants to integrate them and so foster a more holistic appreciation of the overall disaster management role. Comprehensive coverage of critical roles and competences also renders the assessment centre a suitable vehicle for emergency manager selection and training. In addition to the use of situational tests, and their expert observation and evaluation to assess performance, the assessment centre method is an appropriate resource for developing disaster management competencies. To facilitate specific skill development, the experiential aspects of assessment centres foster the development of core cognitive competencies that are fundamental to emergency performance (Paton & Jackson, 2002). "Feedback is integral to the assessment centre process. More importantly, the quality of the feedback provided is high, given that it is derived from expert observation and analysis of performance" (Paton & Jackson, 2002, p. 120). The fundamental problem with this approach is that it depends on the existence and availability of experts.

3.5   IMPLICATIONS OF USING AND ASSESSING EXERCISES

It is generally perceived that exercising provides the chance to test the knowledge, skills, and the abilities of first responders and government officials. Other benefits possibly include perceptions of enhanced teamwork, training adequacy, response network effectiveness, lower levels of job risk, and equipment adequacy (McEntire & Myers, 2004). An example of this is research done by Trinka and Jenvald (2006) who 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. They focus in particular on real decision makers operating in simulated systems involving decision making in critical situations. However in their study they also discuss various implications or methodological lessons that could affect the validity of this methodology. An example of this is the realism of the exercise effecting dynamics of decision making, where participants may act and describe their actions in accordance with operational procedures instead using of rapid decision making techniques.

Perry and Peterson (1999) also investigated the prevailing assumption in research literature that these disaster exercises produce a wide variety of benefits that promote effective emergency management. Nonetheless they concluded by stating that the link between exercise participation and perception of planning adequacy was found to be equivocal. In addition Borodzics and van Harperen (2002) raise a similar issue that learning outcomes maybe evident for the exercise designers, facilitators and observers but that learning outcomes for the actual players themselves (the trainees) may be more difficult to define or measure. Observers may learn differently from participants in the exercise. Borodzicz and van Harperen (2002) said that steep learning curves were shown when trainees were both facilitator and participant. Schaafstal, Johnston and Oser (2001) also draw similar conclusions from their studies saying that training is not always based on learning objectives that are developed from an analysis of the competencies required. They continue to say that the lack of valid, reliable, and automated team performance measurement tools results in an inability to assess and diagnose large scale team training effectiveness, and consequently measures of performance are not

available to justify the large costs involved in conducting mass emergency management exercises.

3.6   CONCLUSION

Learning from experience results in more informed decision making, however without the effective monitoring and assessment of a training and exercise programme the process of learning and development for the organisation is broken. During this literature review it was discovered that there was very little information available specifically for the assessment of training in emergency management and even less for exercises based around EOC activation. MCDEM provides emergency management regional groups with a set of guidelines for CDEM exercising. No doubt these guidelines are a helpful tool for emergency managers, but academic research and studies proving the effectiveness of exercises using local government EOCs are sparse and inconclusive.

Further gaps in research also appear in the area of monitoring and evaluating training and exercises. The assessment of training and exercises is predominantly done using some type or combination of debriefing, with the main aim of answering if the objective of the exercise has been met. There are various general emergency management assessment tools available for assessing response capability. Often included in these assessments were suggestions for the use of exercises as a way of testing response plans (MCDEM, 2010a). However without the ability to accurately gauge the effectiveness of an exercise its usefulness in the testing of plans and capabilities is unfounded. The essential point remains, that training and exercises are expensive, time consuming and resource intensive (Schaafstal et al., 2001). It is therefore imperative that they achieve their main objective, to learn from experience and enhance capability. The assessment of training and exercises needs to establish with some certainty that this objective has been achieved.

CHAPTER 4: DECISION MAKING

4.1   INTRODUCTION

The unique nature of emergency management poses two important questions for decision making; how to make better decisions during response and how to train for them during the readiness phase. Emergency managers have to make decisions about what to do in the face of uncertainty. Decisions can have very high stakes, and are often in the public domain making it more difficult than usual to follow certain well-tested approaches to evading the negative outcomes, of uncertainty (Handmer, 2008). The pattern of decision making in disasters is significantly different from that practiced during non-disaster periods. Uncertainty can paralyse or hinder decisions. Sometimes because of the life and death nature of emergencies decisions must be made rapidly within a whirlwind of activity and emotion (Kuban, 1996). This chapter is about decision making in emergency management, with particular focus on what current literature reveals about how to improve decision making during response. It answers the questions:

> ➢ What do we know about decision making?
>
> ➢ What do we know about training for decision making during response?

Decision effectiveness within emergency management is a function of the capability to access data from diverse sources and render them meaningful within a time frame dictated by an urgent or evolving environment. Consequently, information needs must be considered in relation to those from whom data and information are obtained, those with whom they will collaborate to manage hazard effects, and those to whom information will be provided to facilitate the performance of their role (Paton, Johnston, Flin, Ronan, & Scott, 1999). The effective development of this information sharing capability is dependent on the quality of shared mental models derived from collaborative experience. Further explanation of mental models is given later in the chapter. As discussed in the previous chapter, given that there is limited opportunity for

actual experience, training and simulation represents a highly tenable alternative for facilitating this outcome (Paton & Jackson, 2002; Paton et al., 1999).

Within the activated EOC decisions need to be effective and accurate and often require time efficiency. Problems arise when decisions are slow or not made at all, or alternative choices have been overlooked or ignored. This could happen because ill prepared EOC personnel are not able to use their usual approach to decision making (Boin & Hart, 2003). Uncertainty, intelligence, information sharing, shared mental models, and the training and simulation practice for decision making will be discussed in further detail over the next sections.

4.2 DEFINING DECISION MAKING

Any decision is simply a matter of choosing between two alternatives that will result in either a desired or undesired consequence. This is represented in Figure 7 (Longford, 2008). In theory there are two basic types of decision making. An analytical style, based on weighing up the different options and naturalistic decision making, a faster more intuitive type judgement that relies on experience (Flin, 1996).
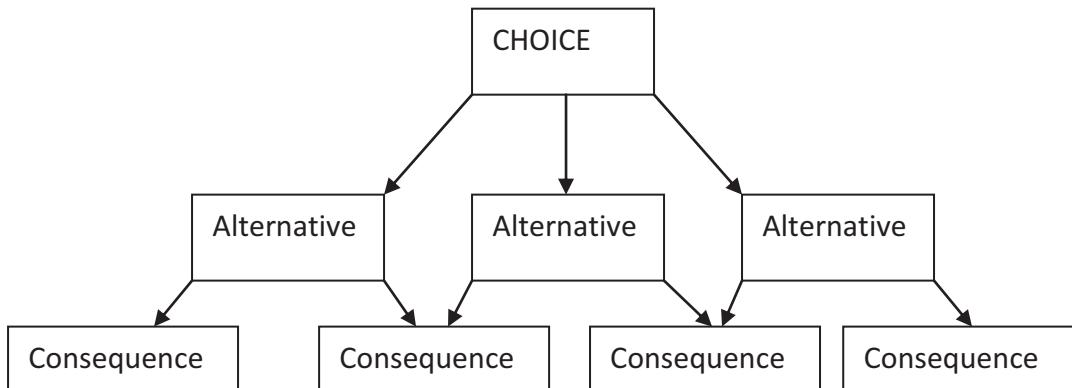

Figure 7: *Representation of the simplified decision making process (Longford, 2008).*

4.2.1 Analytical decision making

Analytical decision making in its simplest form begins with the identification of a problem and the generation of options for solving the problem. This is then followed by the evaluation of each of these options using strategies such as weighting and comparing the relevant features of each option. A choice is made and that choice is implemented. Theoretically, the best decision should be made this way providing there is unlimited time, mental energy, and perfect information available (Flin, 1996). Perfect information means all relevant information is presented without the influence of bias, distracting irrevelant or inacurate information. This analytical approach represents what some researchers call the Classical Decision Model (Klein & Calderwood, 1991). According to Flin (1996) this is typically the way incident management personell are trained. However he also notes, and most of us may have witnessed that in reality decisions can often be made automatically on the basis of experience using an intuitive judgement.

The analytical approach definitely has its place in emergency management, particularly in planning and policy development when time is not limited (Paton et al., 1999). However classical decision models depend on a number of assumptions that are often not applicable to the emergency management environment. These assumptions are; that goals can be isolated, that utilities can be assessed independent of context, that probabilities can be accurately estimated, that choices, goals, and evidence are carefully defined, and that the utilities of an outcome are independent of other outcomes (Klein, 1997). It is apparent that operational environments will rarely meet most of these assumptions. If the assumptions are rarely met, then this model is not useful in explaining how quality decisions should be made during an emergency (Klein, 1997). Care needs to be taken not to force experienced decision makers to adjust to prescriptive models of decision making so their ability to make use of their experience is not compromised. People with experience can use it to generate a reasonable course of action in the first instance (Klein, 1997). It is important to understand the basis of this decision expertise in order to enhance the decision maker's abilities (Klein & Calderwood, 1991).

4.2.2 Naturalistic decision making (NDM)

During response the environment is dynamic, uncertain and considerably ambiguous. An analytical approach to decision making is often inappropriate if not impossible simply because the availability of perfect information does not exist and there is usually not enough time to anaylse all of the options. Until recently the prevailing paradigms in decision research, were based in simplified and highly structured laboratory tasks. Tasks that have limited utility in operational domains characterized by high time pressure, uncertainty, continually changing conditions, ill-defined goals, and distributed decision responsibilities (Klein & Calderwood, 1991). An alternative to this type of research evolved called Naturalistic Decision Making (NDM). NDM is the study of how people use their experiance to make decisions in field settings (Flin, Salas, Strub, & Martin, 1997).

Prominant researchers in this field, Klein and Calderwood reviewed studies based on naturalistic tasks and found that with a different orientation to decision research, a very different model of decision making emerged. They investigated decision making in the field using observations and interviews of staff from various environments such as nuclear power plants, urban fire departments, command and control centres and courtrooms. They identified an alternative description of decision making based on recognising the situation and applying experience to it. This is called the Recognition-Primed Decision-making (RPD) model and it describes how experianced decision makers can rapidly decide on the appropriate course of action in high-pressure situations. RPD lies withing the field of NDM and is particularly useful when studying decisions made in emergency management (Flin, 1996). The simpelest version of RPD is when the situation is recognised by the decision maker and the appropriate response is known already, and the course of action is implimented. If the situation is not imediately reccognised there may be a situation assessment phase included and the use of feature matching or story building will help the decision maker in diagnosing the situation.

Perhaps the most important mismatch between naturalistic decision making and classical decision making models is the fact that the primary effort is usually not the moment of choice but rather in situation assessment (Klein & Calderwood, 1991).

Situation assessment means identifying and clarifying the current state of the world including goals and assumptions. This is sometimes called the pre-decision process (Klein & Calderwood, 1991). Feature matching is where the decision maker thinks of several interpretations of the situation and uses key features to determine which interpretation provides the best match with the available cues. Alternatively these features may have to be combined to construct a plausable explanation for the situation. This is sometimes called story building. In some cases, often where the decision maker is less sure of the situation they will briefly evaluate the situation by mentally preplaying out the course of action to be taken. If problems are identified during this, the course of action is modified (Flin, 1996).

Rational for applying NDM
- Classical methods do not apply in many naturalistic settings
- Experienced decision makers can be used as standards of performance
- NDM tries to build on the strategies people use
- Experience lets people generate reasonable courses of action
  (Klein, 1997)

Scholars have regularly pointed out that during crisis, both the pattern of decision making and the lines of authority are severely tested and altered (Kuban, 1996). Auf der Heide (1989) noted that although it may not be obvious initially, the need for joint decision making during large disasters soon becomes apparent. It appears that often the reason is expediency. One crisis scenario after another reflects the same dilemma, where front line individuals are often left to respond to a rapidly expanding and chaotic situation, with little more than their experience and whatever previous preparation they may have had (Kuban, 1996).

4.2.3 Characteristics and mechanisms of effective naturalistic decision makers

Before discussing how to develop or enhance decision making capability in individuals the characteristics of a good decision maker and the mechanisms they use to make their decisions need to be identified. NDM was used by Canon-Bowers and Bell (1997) to identify the characteristics and mechanisms of an effective decision maker to determine what experts did that was different from novices when making decisions. They give six notable characteristics of an effective decision maker and five mechanisms that the decision maker uses to make good decisions.

Characteristics of an effective naturalistic decision maker:

1. **Flexible** - the decision maker needs to be able to cope with a changing and ambiguous environment.

2. **Quick** - often time pressure is a considerable factor for the decision maker; it is also the single most important feature that differentiates NDM from analytical decision making.

3. **Resilient** – the decision maker must be resilient to stress from high workload, environmental uncertainty and ambiguity and able to make high consequence decisions.

4. **Adaptive** – emergency events may unfold rapidly and decision making becomes a process of continual strategy assessment and modulation.

5. **Risk taking** - risk assessment with various courses of action and weighing the consequences of potential error against payoff is vital for the decision in some cases.

6. **Accurate –** there is high demand for accuracy of the decision.

(Canon-Bowers & Bell, 1997)

Mechanisms experts use for making decisions:

1. **Situation-Assessment Skills**

Literature and research suggests that expert decision makers are able to perform situation-assessment more quickly and accurately than novices. Overall it is believed that situation-assessment accounts for much of the

ability of experts to make rapid decisions, and it also contributes to their decision making accuracy. Two aspects of this situational behaviour are cue and pattern recognition. Experts are better and faster at identifying the relevant cues, the significance of them, and the patterns that they form.

2. **Organised Knowledge Structures**

   Experience allows experts not only to know more, but also to effectively organise what they know. Knowledge templates can be built up by the individual from this experience. These templates are well organised knowledge structures containing objective features (for example goals), action features (such as methods), and environmental features.

3. **Mental Simulation**

   When a situation is novel (in other words there is no prior template) it is hypothesised that mental simulation is the primary mechanism for selecting a course of action. The individual mentally rehearses or plays out the decision and its consequences prior to making the decision. This allows the decision maker to determine if a possible solution is viable and can be applied to the situation or needs adjustment. This method contributes to the accuracy of decision making and saves time.

4. **Strategy Selection/Modulation**

   Skilled decision makers learn strategies best suited to the situation, and continue to regulate the chosen strategy in relation to a changing or potentially changing environment. Continual assessment and modulation is required.

5. **Reasoning Skills**

   These skills include creative problem solving, analogies, critical thinking (such as testing assumptions, checking facts, seeking consistency among cues), and domain–specific problem solving skills.

(Canon-Bowers & Bell, 1997)

4.3   FACTORS INFLUENCING DECISION MAKING

During the operation of an EOC in an emergency it is often required that decisions be made by personnel in the EOC with imperfect data and under considerable time pressure. This situation can be stressful for an unprepared person in the EOC. How decisions are made in this setting are important for the response and recovery of the emergency. Boin and Hart (2003) discuss leadership challenges in crisis management and note that organizational chaos, media pressure, stress, and inaccurate information are but a few factors that make it very hard for crisis leaders to make sound decisions. They say that successful crisis leaders bypass routine policy-making procedures to speed up decision making. Boin and Hart go on to say that short-circuiting the decision-making process can speed the government's response capacity. Gone are the endless negotiations with many stakeholders. Instead of brokering painstaking compromises, leaders actually make decisions and issue orders that other actors simply have to follow. Leaders are required to make crucial and controversial decisions without engaging in the normal procedures of consulting all involved (Boin & Hart, 2003).

Factors influencing the decision making process and the decision maker are wide and diverse. This section will introduce only a few of the most known and recent factors taken from emergency management research literature. At the organisation or group level some of these factors are coordination, cooperation, communication, and constraints such as clashes over organisational domains or jurisdictional differences, information sharing and intelligence, team work and shared mental models, policy ideology, political and economical priorities and uncertainty. Some of these factors will overlap onto the individual decision maker and could also include the individual's experience, knowledge, skills, trust, stress risk, time pressure, leadership ability, overwork, conflict over responsibility, personal priorities, control, deviance, and political goals (Boin & Hart, 2003; Handmer, 2008; Quarantelli, 1997).

There is a lot of onus on the individual decision maker in emergency management. Handmer (2008) explains sources of uncertainty as three different human factors. They are; that humans do not have perfect knowledge; that the future is not known; and that

the perfect application of knowledge is not possible. Thus even with perfect knowledge and a known future, human factors such as deviance (power control, desire for excitement), political and economic priorities, implementation problems, policy ideology, all conspire to prevent the perfect application of knowledge (Handmer, 2008). These uncertainties expose the decision maker to considerable stress risk. It is therefore important to reduce this stress-risk by improving the decision making confidence and capabilities of these individuals (Paton, 2003).

4.3.1 Uncertainty

"Emergency managers who pause for certainty are in for a long wait!" (Handmer, 2008, p. 236)

Uncertainty is defined as; not known or established, questionable, not determined, undecided, or not having sure knowledge (Longford, 2008). Decision making may be paralyzed by uncertainty. A tendency among some emergency managers is to wait for certainty to avoid making a small error. But this may result in a major mistake (Handmer, 2008). Possible external sources of uncertainty include media and political response, the impact on people and property (this is reduced by the availability of science and technology, but is often based on assumptions and judgements). Other sources could be the spatial scale of the hazard and the degree of impact and exposure to risk of especially vulnerable groups, such as people in hospitals, care facilities for the aged or prisons (Handmer, 2008). Internal sources of uncertainty include operational issues such as dealing with the emergency management network of organizations and people many of whom are volunteers, highly territorial, and have incompatible management cultures, communications systems, and missions. There are also internal uncertainties about predictions of events (for example flood or storm forecasts) which can be closely related to the experience of key decision makers, which is frequently limited. There is often fear of taking a decision in case it is wrong; for example deciding to delay evacuation (Handmer, 2008).

Information itself, either in abundance or in scarcity is the basis of most uncertainty; therefore a tool which helps to alleviate the effects of both these conditions should be beneficial in reducing uncertainty. Intelligence is such a tool (Longford, 2008). A combination of technology, human interaction, and information sharing will ensure that uncertainty can at least be coped with. According to Longford education about the intelligence cycle discussed in the next section and what it has to offer, along with rigorous application of it, may be an answer to how uncertainty can be managed and potentially overcome.

4.3.2 Intelligence and information sharing

Intelligence is operationally defined as information to which value has been added for the purpose of explaining trends and patterns and enabling decisions. It can be a product or a process (Longford, 2008).

Intelligence helps to support better decision making and reduce uncertainty in the following ways:

- Identifying trends and patterns
- Providing explanations for patterns and trends
- Highlighting risk
- Illuminating alternatives
- Providing visibility of potential consequences
- Instilling objectivity
- Reducing cognitive bias
- Identifying and acknowledging intelligence gaps
  (Longford, 2008)

When intelligence is described as a 'process' the intelligence cycle in Figure 8, ensures that the 'product' is one that supports decision making. This cycle contributes to enhanced decision making by continuous improvement and assessment, with feedback. Skipping any one of the steps invalidates the process and any subsequent product. The analysis component constitutes the most difficult aspect of the cycle, yet contributes the greatest value to the end product and hence to the decision making process. The process itself is not difficult or complicated, although requires considerable training of

practitioners for them to be effective in applying it (Longford, 2008). It is the evaluation and analysis part of intelligence cycle where the NDM training is focused in the next section.

Intelligence as a product is part of the information required to make a decision. As an effective process the cycle in Figure 8 can be used as a tool to enhance information sharing capacity. The flow of information is important. For the decision maker in the group, information seeking can switch from being explicit (requesting information) to being implicit (being provided with information). Unprompted information allows for time and energy input into other tasks and speeds the decision making process (Longford, 2008).
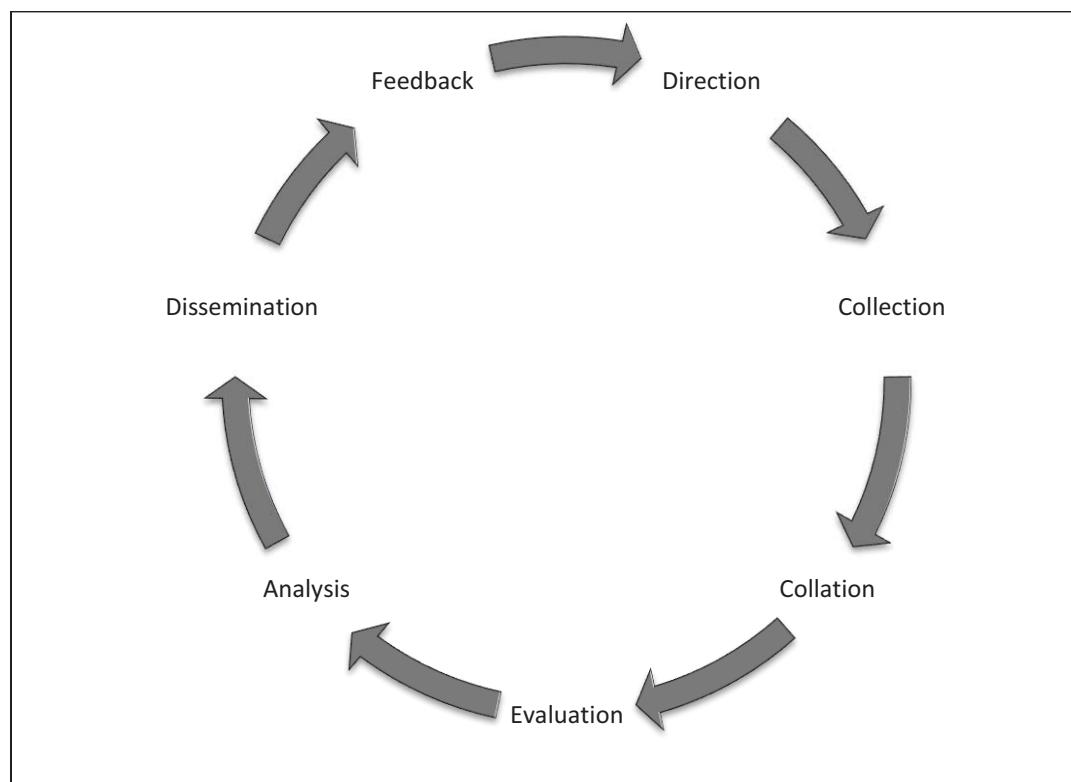

Figure 8: The intelligence cycle representing intelligence as a process (Longford, 2008, p. 122).

4.3.3 Mental models

For the information-gathering intelligence process to be most effective, team members require a good understanding of the information required by decision makers at critical periods. They must have a good team mental model. This means effective multi-

organizational and multi-disciplinary coordination and performance within operating teams (Paton & Jackson, 2002). Mental models are generated by the accumulation of experience and provide a psychological basis for understanding, response planning, and for predicting outcomes (Paton, 1996). As members of teams learn to work together and gain more practice at specific roles in those particular environments their team mental models develop. This, in turn, increases implicit information sharing during high workload periods enhancing team performance (Paton & Jackson, 2002).

There are links between training emergency management teams and enhancing the decision capabilities of responders. According to Schaafstal et al., (2001) team training involves developing an expert 'team of teams'. Meaning for example if applied to the EOC, that training needs to develop an EOC response team that includes all of the required agencies to develop a group team mentality based on efficient team work (including coordination and communication). Training and exercises are the tools to develop this capability. They describe a variety of techniques to enhance team performance. These were cross-training and team model training, critical thinking training, and guided team self-correction.

4.4   DECISION MAKING TRAINING

How to improve performance in the uncertain hazard environment is one of the major challenges emergency managers face particularly with the ever increasing critical scrutiny from media, politicians and the community at large (Handmer, 2008). Whilst many techniques are available to train physical skills, there are few effective training techniques and tools to teach critical decision making skills. Often the use of conventional techniques for decision making training are not efficient because of the cost of conducting large scale simulated emergencies, the risk to the participants, and the unique nature of each type of emergency situation (Kincaid et al., 2003). Within Longford's intelligence cycle there is a stage for evaluation and analysis of the information, which he states is the most important part for decision making. Key aspects of what to train and how to train decision makers for response, using principles of NDM

are listed in later in this chapter. The evaluation and analysis of the situation and the information available being a fundamental focus area for the suggested skills.

The task of generating cognitive training principles for decision making is not straight forward (Canon-Bowers & Bell, 1997). NDM is not characterised by an invariant set of steps or procedures as prescribed by normative theories. Instead decision making is seen as intertwined with task accomplishment, context-specific, fluid, flexible, and in some respects 'procedure free', or at least lacking prescribed rules present in more classical decision theory (Canon-Bowers & Bell, 1997). Goals such as, achieving flexibility in people, or teaching decision making that does not follow a set of predetermined steps are difficult to achieve using traditional training methods. Canon-Bowers and Bell say that while knowledge, skills, and processes underlying decision making can be identified and trained we should not devise or specify a rigid set of steps for decision making. Earlier in this chapter Canon-Bowers and Bell's set of characteristics that describe expert decision makers and the mechanisms of NDM were listed. They examine the processes, knowledge, and skills that NDM theories suggest are responsible for expert performance and from here training methods, strategies, and designs can be suggested. The value of NDM theories in designing training lies in what they have to offer regarding knowledge, skills, and processes that underlie expert performance (Canon-Bowers & Bell, 1997). In domains where critical decisions are made by inexperienced people, our task is to enhance skill level (Klein, 1997). In accord with this Canon-Bowers and Bell's (1997) goal of decision training was to accelerate the natural process leading to expertise using the characteristics and mechanisms of decision makers explained earlier in this chapter. This research also complements that of Dreyfus (1997) who devised a five stage model of skill acquisition. Those five stages are novice, advanced, beginner, competence, proficient, and expertise.

Another suggestion comes from Klein and Calderwood (1991). They say that rather than trying to train general skills it would be more effective to use domain-specific training programmes and augment these with feedback and training scenario features that focus on decision processes, thereby leveraging the value of the existing programmes. We may need to learn how to restructure existing courses so that students can learn how to

conceptualize situations quickly and effectively, and to perform effective mental simulations.

From the literature discussed in this chapter decision making training can be summarised into a list of what to train and another of how to train decision makers. This list demonstrates that within the available literature there is a range of possible suggestions about how and what to train decision makers. The two questions at this stage are:

➢ Is this terminology and knowledge familiar to the emergency manager?

➢ Are these methods being used in local government EOCs to train decision makers?

Listing Skills and the application of how to train Naturalistic decision makers:

Skills to train decision makers (what to train):
> Metacognitive skills
> Mental models
> Reasoning skills
> Domain-specific problem-solving skills
> Mental simulation skills
> Risk assessment skills
> Situation awareness and assessment skills

Application of skills to train decision makers (how to train):
> Simulation
> Guided practice and feedback including scenarios
> Embedded training
> Cognitive apprenticeships
> Cognitive feedback within the after action review
> Multimedia presentation formats
> Pattern and Cue recognition practice, discussion of typical cases and anomalies.

(Canon-Bowers & Bell, 1997; Klein, 1997)

4.5   CONCLUSION

The importance of decision making has been made evident in every chapter of this thesis. Poor decisions lead to poor emergency management. Therefore effective and efficient decision making needs to be researched and understood, learned, practiced, and effectively implemented during response. In this chapter the two types of decision making, analytical and naturalistic were discussed. The analytical approach definitely has its place in emergency management particularly during readiness and recovery phases. But during the faster paced critical response phase of an emergency analytical decision making could be a hindrance. Hence NDM within this context is important.

In this chapter the characteristics and mechanisms of successful naturalistic decision makers were identified and factors that influence decision making outlined. Uncertainty is described as a dominant factor influencing decision making. Uncertainty can be reduced or managed using intelligence and information sharing. Longford's intelligence cycle shows the process of information sharing with the end result, the product, being the information to utilise during decision making. Decision making efficiency and accuracy is dependent on the success of the intelligence cycle and the quality of its product. The efficiency of teams working through the intelligence process influenced by their team mental model enhances the success of the intelligence cycle. In keeping with NDM principles this section provided a list of what to train and how to train decision makers. Training for response needs to incorporate all of these factors to improve decision making.

There is a need to know if emergency managers are utilising the recent decision making research. Emergency management organisations may need to learn how to restructure existing courses so that emergency managers learn how to conceptualize situations quickly and effectively, and to perform effective mental simulations, to develop team mental models and practice naturalistic decision making during preparedness (Klein & Calderwood, 1991).

CHAPTER 5: METHODOLOGY

5.1 INTRODUCTION

From the introduction and literature review in the previous four chapters it has been brought to attention that local government organisations are an essential part of community emergency management and disaster response. As part of their response capabilities most local government organisations have an EOC. Usually within these EOCs an incident command system of some sort is employed to command and control the operations of the emergency. Decisions are made by individuals in the EOC during response that may be unique to the emergency response situation. Preparedness activities, such as training and exercises help to ready those individuals for their response roles in the EOC. However little research has been done on the effectiveness of preparedness activities in local government EOCs.

In this chapter the development and distribution of an emergency management questionnaire delivered to government organisations across New Zealand and North America is explained. Forty eight different government organisations participated in the questionnaire. The data collected is a sample of initial exploratory research for local government organisations that are responsible for emergency management in their areas. The aim of the questionnaire was to collect data about each organisation's EOC activation in real emergencies, in training and simulations and the general understanding of decision making used within the operating EOC from the participants of this study. The methods used to collect the data are described in this chapter. The ethical considerations for this research, how the participants were selected, what the response rate was, how the questions were chosen, and how the results were analysed are also detailed.

5.2   APPROACH AND DATA COLLECTION

A questionnaire based survey approach was used in this research because it provided for a simple time and cost effective method of collecting data about the current practice within the targeted organisations. In addition data about the attitudes, values, and knowledge of the individual respondents was also collected through the questions asked.

The participants of the study were sent an email with a direct link to the questionnaire. The participants could fill out the questionnaire in their own time and press a submit link which would automatically send the completed questionnaires back to the initiator. Concurrently the data would automatically collate on an online spreadsheet. See Appendix A for a copy of the questionnaire. The participants also received a definition sheet containing standard definitions of all of the terms used in the questionnaire. This sheet was used to ensure all participants understood the terms used in the questionnaire. Referring to this sheet was optional and it is unknown which participants referred to this sheet and which did not as they answered the questionnaire. The definition sheet is presented in Appendix B.

5.2.1 Selection of participants

The participants selected for this study were from New Zealand and North America, (BC in Canada; and CA, CO, and WA in USA). New Zealand's emergency management incident management system, the Coordinated Incident Management System (CIMS) and the EOC organisational structure is based on the North American systems, British Columbian Emergency Response Management System (BCERMS) and USA's, National Incident Management System (NIMS). North American systems have been influencing New Zealand's emergency management over the past decade at least. Therefore, in addition to a study of EOCs and training in New Zealand, various similar governmental organisations across North America were approached and asked to participate in this study. All those who answered the questionnaire were either the emergency manager of the organisation or their direct assistant or the 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.

The decision making section had questions encouraging answers with a more personal perspective of the subject. This section of the questionnaire was designed to gain a preliminary understanding of how emergency managers felt about decision making in an emergency management context. This initial questioning could be used to guide more in-depth studies in future research.

The North American participants were chosen based on their geographic location and the types of hazards that their communities face being of a similar nature to those experienced by New Zealand communities. Most were in coastal areas. For example, the councils on British Columbia's Vancouver Island were contacted because the island is of a similar size and demographic to New Zealand, and the hazards faced by the island's communities are similar to those of New Zealanders.

5.2.2 Participant contact

After an initial phone call the questionnaire was sent to each agreed participant's personal email. This method of questionnaire distribution provided anonymity for the participant so they did not feel pressure or scrutiny from their peers or the researcher. However some disadvantages of this method are low response rate, low participant commitment to the study, or participants not being truthful or serious in their answers. This was mitigated for by an initial phone call with a personal introduction from the researcher and an explanation of the purpose of the study and the advantages to them if they participated in the study. The primary motivator for organisations to participate was that on completion of the study the organisation would receive a report of the results and conclusions. Using this report the participating organisation would be able to compare their current practice in relation to other similar organisations.

Some of the difficulties encountered were that the participants could not ask for clarification of the questions, nor could the researcher ask for further details in the participant's answers. Therefore there may be some ambiguities or misunderstandings in the data interpretation. Questions were designed to complement each other, so that inconsistencies in participant answers could be identified. The places where this occurred are noted in the corresponding results sections.

5.3 ETHICAL CONSIDERATIONS

This research was conducted in accordance with the Massey University Ethics Guidelines. Participants were informed that participation was completely voluntary and all data would be anonymous, confidential, and destroyed on completion of the study. All of this information was outlined on the cover sheet in the email the participants received with the electronic link. There was also a question at the end of the questionnaire ensuring that the participants agreed to participate in this study in accordance with the conditions set out in the email. See the information sheet on the first page of the questionnaire in Appendix A.

On occasion research and the questionnaire follow-ups in particular areas were discontinued due to hazard events occurring in that area over the data collection period. Contacting these organisations during emergency events was deemed to be inappropriate. These events included the British Columbian summer fires. At one point during midsummer (August 2010) there were 19 reported wildfires in BC (BC Wildfire, 2010). Colorado, Boulder County also suffered particularly damaging fires during the follow-up phase of the questionnaire so further contact with these organisations ceased. This was due to the Fourmile Canyon Fire that broke out on the sixth of September 2010 and took seven days before it was contained. It was the worst wild fire on record for Boulder County with more than 130 properties damaged (Boulder Mountain Fire Protection District, 2010). Follow up within the Christchurch area in New Zealand also ceased due to the Earthquake that struck on the fourth of September 2010.

5.4   RESPONSE RATE

A total of 48 completed questionnaires were received out of 96 organisations contacted. 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 in the study. Twelve of these 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. Seventeen agreed to participate over the phone but did not return the questionnaire. Eleven were not reached by phone so the electronic questionnaire was not posted. 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.

Table 2: Number and type of participating organisations (n = 48).

Type of organisation	Number of participating organisations	%
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

5.5   QUESTION SELECTION AND QUESTIONNAIRE STRUCTURE

An extensive literature review, and advice from experts in the field, guided the development of the questions posed in the questionnaire. To date there has not yet been a comparative study of the current use of EOCs in real situations, in training, exercises, or simulations in local NZ government organisations compared to those conducted in offshore emergency management local government organisations. Questions were aimed at gathering information about how and how often the organisations used their EOC, the types of exercises they used in training, whether they used their EOC during these exercises, and what the participants felt they knew about emergency management decision making.

The questionnaire comprises of two introductory questions and three sections. First, the participant was asked to state the name of the organisation he or she is representing. Next, a question asks about the recent history of emergencies in their local area. This question was designed to gather data of the different emergency experiences that the participating organisations may have had prior to the influence of the other questions in the questionnaire. The order that the questions appeared in was carefully chosen to mitigate the effects one question could have on the response to another. Each of the three sections may be answered independently of the other sections.

Section one asked participants specifically about their organisation's EOC, how often the EOC was activated under real circumstances, or was used in training or simulations. Section two asks participants about general emergency management training and simulations, regardless of EOC activation. This section was designed so that the questions could be answered even if the participating organisation did not have an EOC, or did not activate its EOC in training but did conduct emergency management training and exercises. Exercise frequency and assessment was also asked about in this second section. Section three considers decision making within the emergency management context. The questions in this section were designed to explore the decision making knowledge that the participant had, and identify whether they felt that they needed

more support or understanding in the area of how to make decisions in emergency management, more specifically while operating in an EOC.

5.6   DATA ANALYSIS AND FINDINGS

Before we can count events in a quantitative study it is important to know what it is to be counted. In order to collect numerical data and quantitatively analyses it the researcher must first know what data to collect (Green & Browne, 2005). The exploratory research of this thesis aimed to collect qualitative data that could aid the development of quantitative methods in future studies.

A combination of closed and open ended questions was used in the questionnaire resulting in data that could either be analysed qualitatively or quantified using a quasi-statistical approach. Quasi-statistical approaches use word or phrase frequencies and inter-correlations as key methods of determining the relative importance of terms and concepts (Robson, 2002). Often the closed questions were supported by optional open questions inviting the respondent to add to or further explain their answer so as not to restrict the participant's answers. All of the questionnaire responses were automatically collated on a spreadsheet which was then translated to an excel spreadsheet. At first each question was viewed independently. For questions ii, 2,3,5,7, 8, 9, 10, 11, 12, 13, 15, 17, 18, 20, 22 and 23 the individual responses were coded and converted to percentages of the total number of respondents. There was also a comparative analysis done of the percentages of NZ organisations against percentages of NA organisations for these questions. Due to the small sample of only 48 no statistical analysis was conducted on the differences between NZ and NA organisations. Comparisons were presented graphically and any interesting differences were mentioned. Questions 6, 14, 16, 19, 21 and 24 were analysed qualitatively and the more frequent answers collated and presented graphically with notable comments quoted in the text.

CHAPTER 6:   RESULTS

6.1   INTRODUCTION

Results from the questionnaire that was sent to the emergency managers of 48 local government organisations are presented in this chapter. The questionnaire in Appendix A is divided into three sections. They are, EOCs, emergency management training, and, decision making in emergency management. There are also two introductory questions, the first [Q i] asked what the name of the participating organisation was, and the second [Q ii] asked if the organisation had experienced any real emergency events in the last five years. The answers to the first introductory question have not been included in this thesis due to privacy, but the information was required for identification and future contact purposes. It was important to know if any of the organisations had experienced real emergencies in the past. Therefore answers to the second introductory question provide an emergency management context for the following 24 questions presented in sections 1, 2, and 3. The questions are presented in the order they appeared in the questionnaire and the question numbers correlate exactly.

Q ii)   Summary of emergency events

This question was used to determine if the organisation had had any previous experience of emergencies in the last 5 years. It referred to all possible events that may have had some impact on the organisation. This includes declared and non-declared emergencies, alerts, and/or activation of EOCs. Out of the 48 organisations, 40 organisations, or 83% had been impacted by a hazard of some sort in the last 5 years, while 7 stated that they had not been affected by any emergency events. This hazard information is summarised in Table 3.

Table 3: The range of hazards that the organisation has been affected by over the last 5 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%

6.2 SECTION 1: EMERGENCY OPERATIONS CENTRES (EOC)S

Q1. Does your organisation have an EOC?

All organisations that completed the questionnaire had an EOC.

Q2. How often has the EOC been activated under real circumstances in the last 5 years?
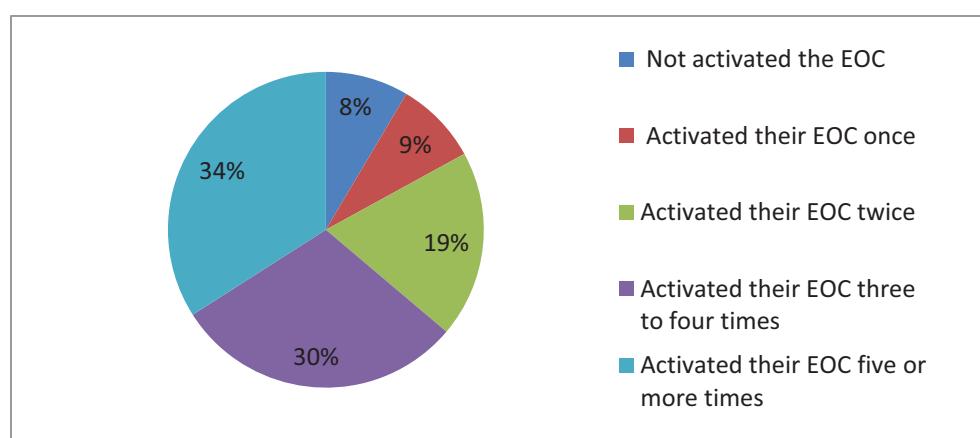
Figure 9: Results for Q2

Over 60% of organisations activated there EOC three or more times in the last five years. Eight percent had never activated their EOC, Figure 9 shows these results. The results of

NZ and NA organisations were compared against each other with high use of EOC activation evident in both. These results are shown in Figure 10.
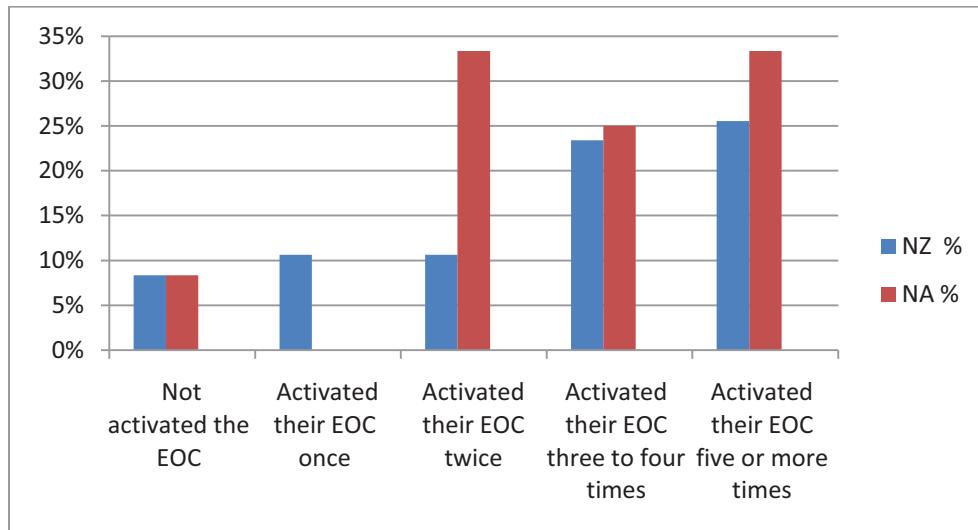
Figure 10: Comparison of NZ and NA results for Q2

Q3.   Can you name or describe some of these events?

A direct comparison with the respondent's answers to question ii) demonstrates that 83% of respondents answered question 3 in the same way they answered question ii. The other 17% had not had any real events affect their local area [Q ii] but that they had activated their EOC for various events. Some examples of these are, storm flooding and inundation, 2010 Olympics and Paralympics Winter Games, a wind storm in 2008 and local flooding in 2008. Some respondents answered 'no' to question ii but went on to answer question 3 by stating that they did have various activations due to real events such as fire, wind storms and landslides. It is possible that those areas had been affected by emergency events even though the respondent said there were no real events in the area in question ii. **Table 4** shows the answers for those participants who answered 'no' to question ii against the same participant's response to question 3. All participating organisations have an EOC [Q 1], and most have activated for emergencies that have affected their area. Table 4 shows the possibility that more organisations have experienced emergency events as defined in this study than the results from question ii indicate.

Table 4: Comparison of respondent's answers to Qii and to Q3.	
Respondents who answered 'none' to question ii.	**Same respondent's answer to question 3**
None	*Tamahare Fire - killed or wounded 5 Fire Fighters* *Tornado* *Flooding x 8 evacuations x 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*

Q4.   Does the EOC activate for emergency management training or simulations?

Only one NZ organisation did not activate their EOC for emergency management training or simulations.

Q5.   If so, how often do the training or simulations in the EOC occur?
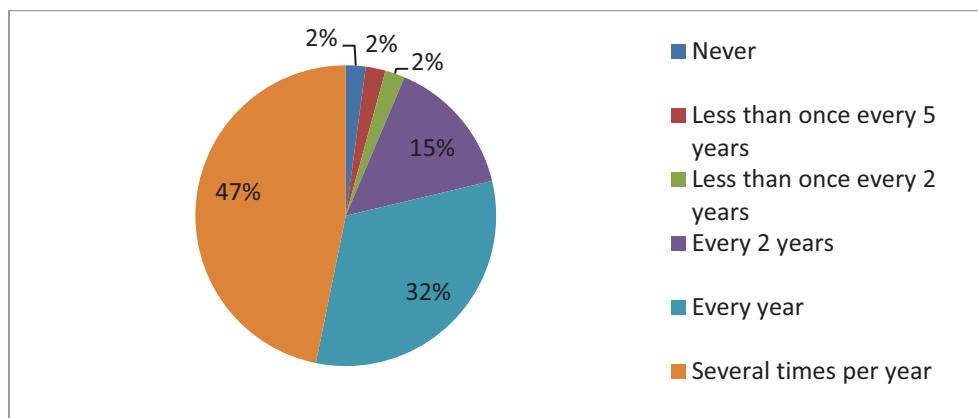
Figure 11: Results for Q5.

Figure 11 shows, that seventy-seven percent of the organisations in this study activated their EOC for training or simulations one or more times per year. One organisation had never activated their EOC, one had activated their EOC once in the last 5 years, and one

once in the last 2 years. Figure 12 shows the distribution for NZ and NA, both showing that most organisations activated their EOC for training or simulations one or more times per year.
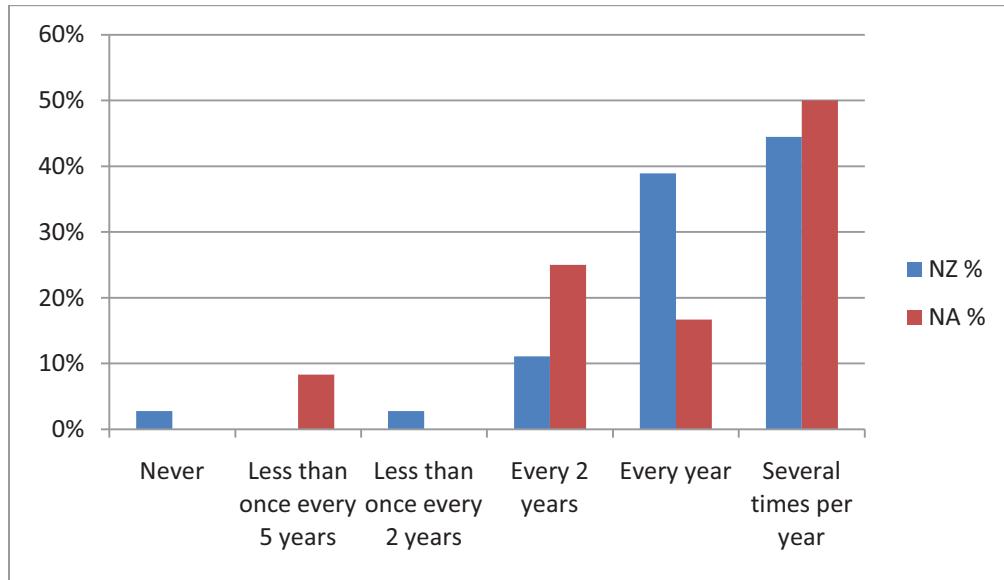

Figure 12: Comparison of NZ and NA results for Q5.

Q6.   Detail the training program your EOC follows if you have one. How often does training occur, and what type of training or simulation is it? What is the frequency of each type of training?

Summary of answers:

Forty-three participants answered this question. The most common answers were that organisations participated in various different exercises ranging from table-top and orientation, to full-scale and used role-playing or simulations regularly. One NZ organisation noted that they had recently handed over to the regional council and training was still under review.

Throughout the answers there were often references to specific courses or organisations that offered training. These were the Group Emergency Operations Centre (GEOC) training, the Emergency Management Training Centre (EMCT) unit standards, Telford

Rural Polytechnic, Emergency Co-ordination Centre Level 2 and 3 (ECC2 and ECC3)[6],
CIMS courses of varying levels, BCERMS courses also of varying levels and MCDEM
courses. Two major New Zealand exercises were mentioned, Exercise Pandora and
Exercise Ruamoko.

One organisation detailed their 10-module training programme with course titles such
as Basic CDEM, Stress Management, Health & Safety, Skills Rotation 1 & 2, CIMS levels 2
& 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 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."*

One 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

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[6] The course provider is unknown.

that a formal training programme was developed and overseen by their CDEM Group Training Officer.

6.3   SECTION 2: CIVIL DEFFENCE EMERGENCY MANAGEMENT TRAINING

Q7.   Does your organisation participate or conduct civil defence emergency management training or simulations?
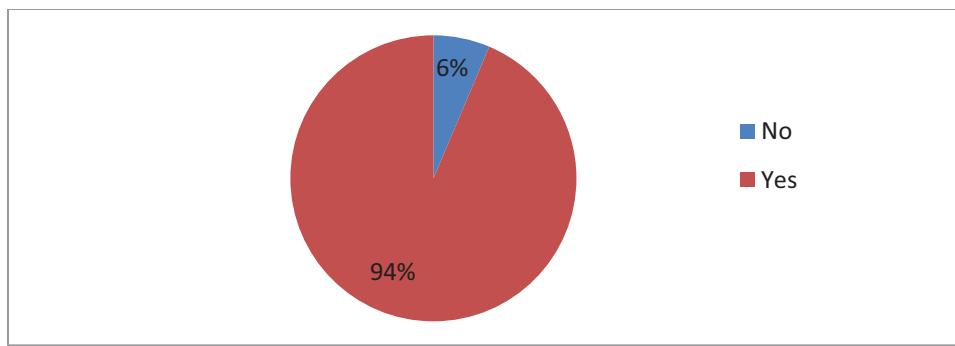

Figure 13: Results for Q7.

Figure 13 shows 94% of organisations answered yes to this question. Three out of the 48 participants said that they have an EOC but do not use them for training, and do not do any emergency management training at all. These were all NA organisations, one from CA, one from BC, and one from WA. However there is an inconsistency across the answers of these participants for this question [Q 7] and question 4. In question 4 only one NZ organisation stated that they did not use their EOC in training. Despite these inconsistencies the overall result is that almost all organisations participated in emergency management training or simulations.

Q8.   Does your organisation use tabletop exercises as a training method?
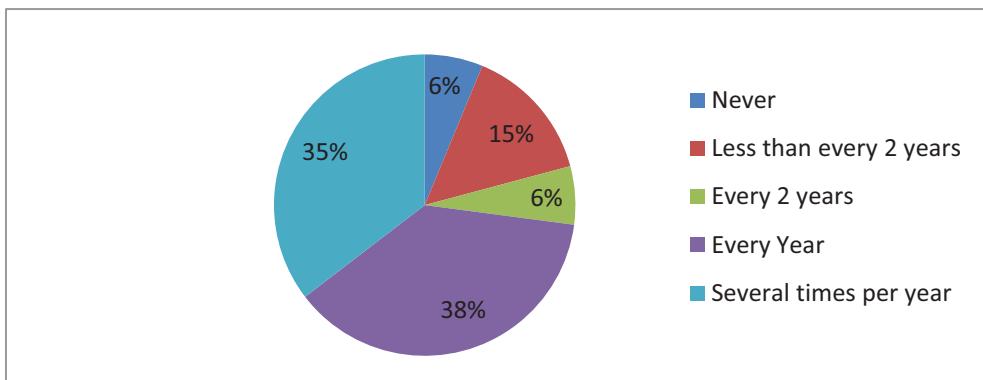
Figure 14: Results for Q8.

Figure 14 illustrates that 73% of total organisations said that they used tabletop exercise as a training method one or more times per year. Figure 15 shows the comparison of NZ and NA with most organisations using table top exercises frequently.
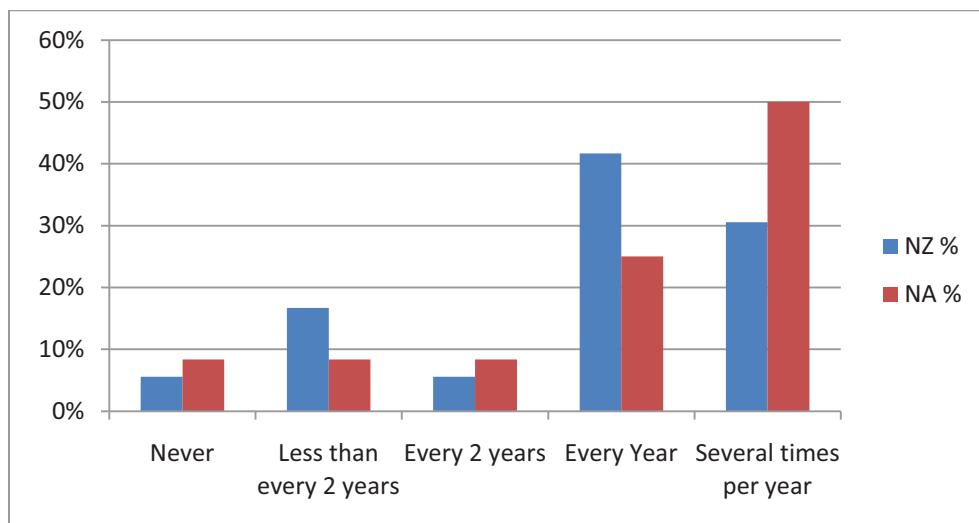

Figure 15: Comparison of NZ and NA results for Q8

Q9.   Does your organisation use Drills as a training method?
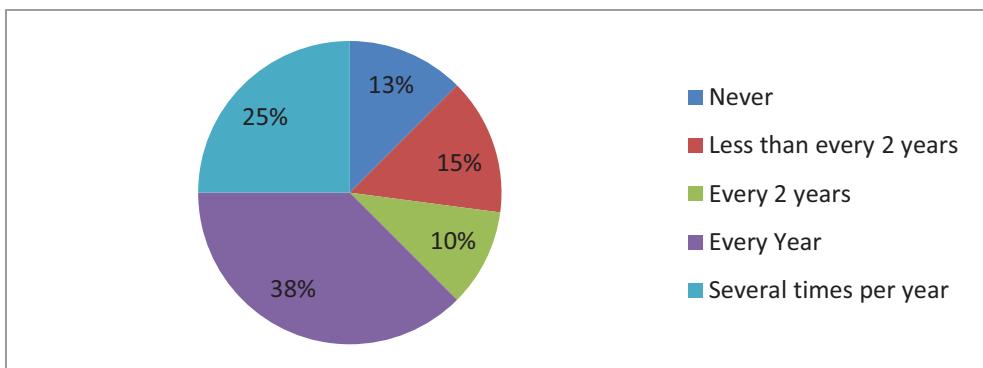
Figure 16: Results for Q9

Figure 16 illustrates that 63% of organisations used this method one or more times a year. Thirty-eight percent said they used this method every year and 25% used the method several times a year and 13% never used this method. Figure 17 shows the distribution for NZ and NA for this question.
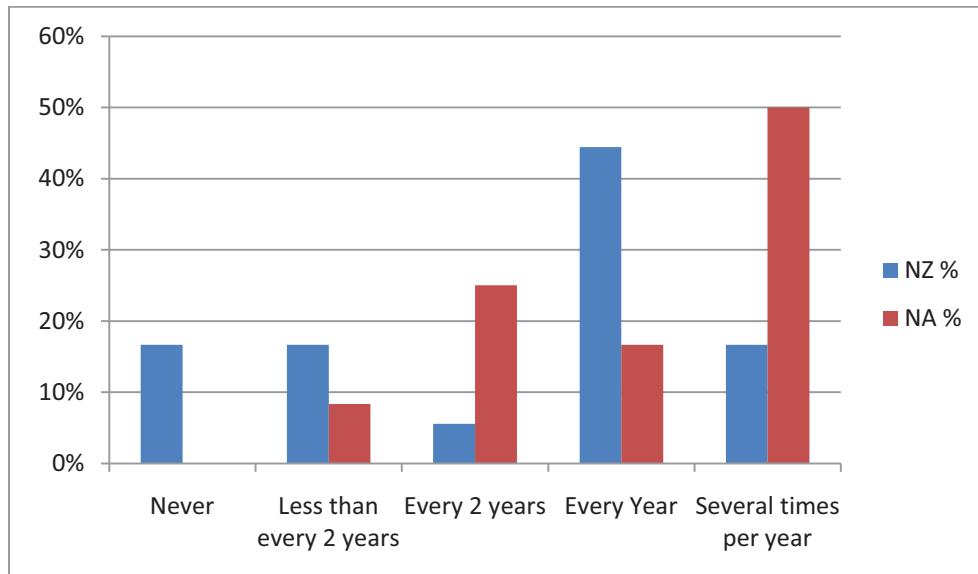

Figure 17: Comparison of NZ and NA results for Q9.

Q10.   Does your organisation use orientation exercises, lectures, seminars, or discussions as a training method?
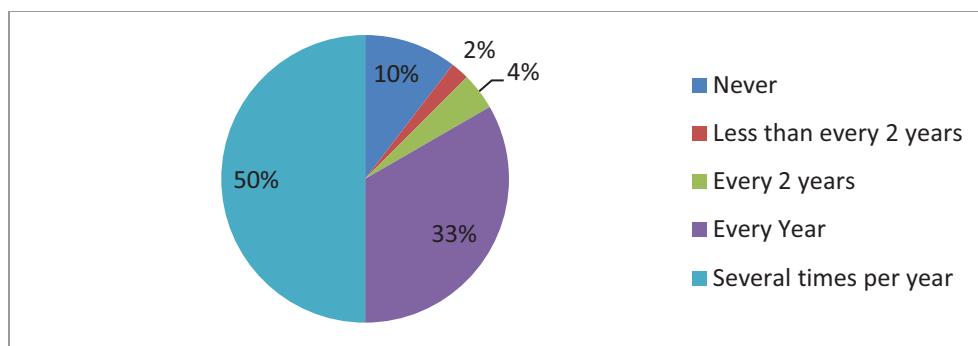

Figure 18: Results for Q10.

Figure 18 shows 83% of participants said they used this method one or more times per year. Fifty percent said they used the method several times a year. Thirty three percent used the method every year. Four percent used the method every 2 years and 2% said the method was used less than every 2 years. Ten percent had never used this method. Figure 19 shows the comparison of results from NZ and NA with similar frequencies reported.
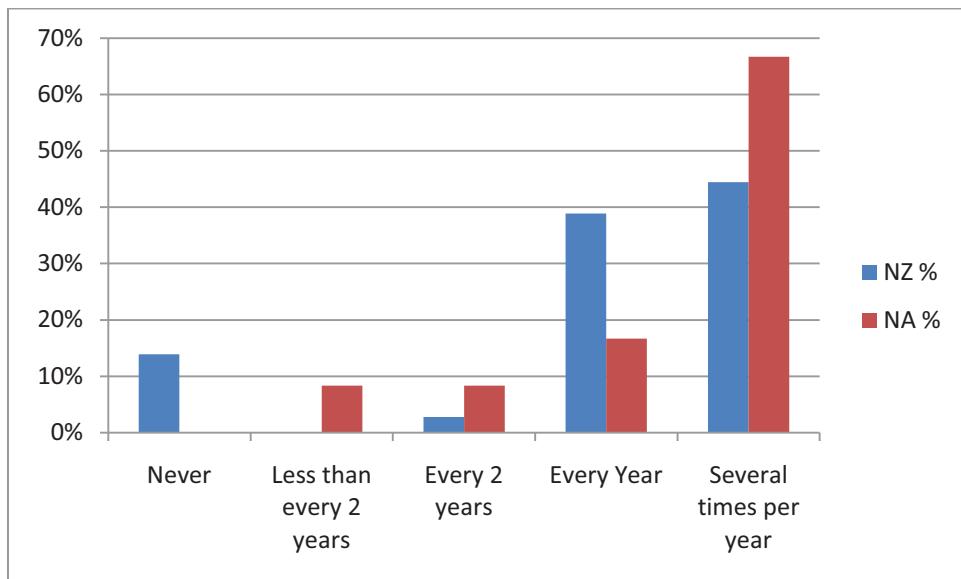
Figure 19: Comparison of NZ and NA results for Q10.

Q11.   Does your organisation use Functional, Operational or Tactical exercises as a training method?
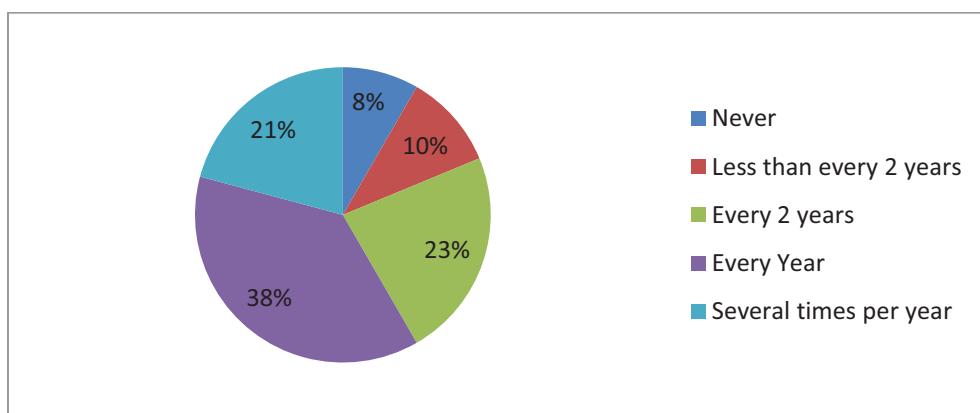

Figure 20: Results for Q11.

Fifty-nine percent of organisations used this method of training one or more times per year. Twenty-one percent said they used the method more than once in the year, 38% said they used the method every year. This data is shown in Figure 20. Figure 21 shows the comparison of NZ and NA results.
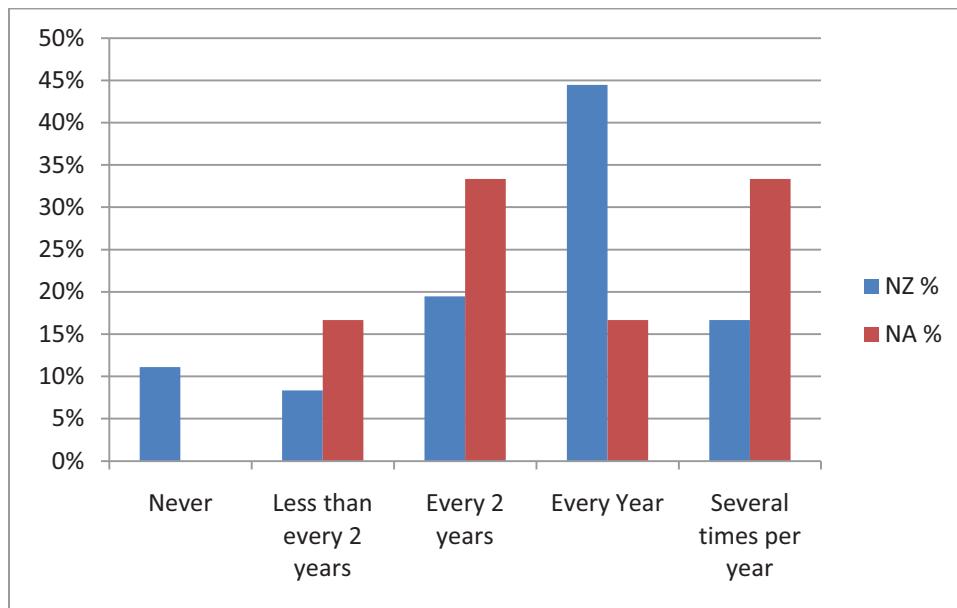
Figure 21: Comparison of NZ and NA results for Q11.

Q12.   Does your organisation use Full Scale exercises as a training method?
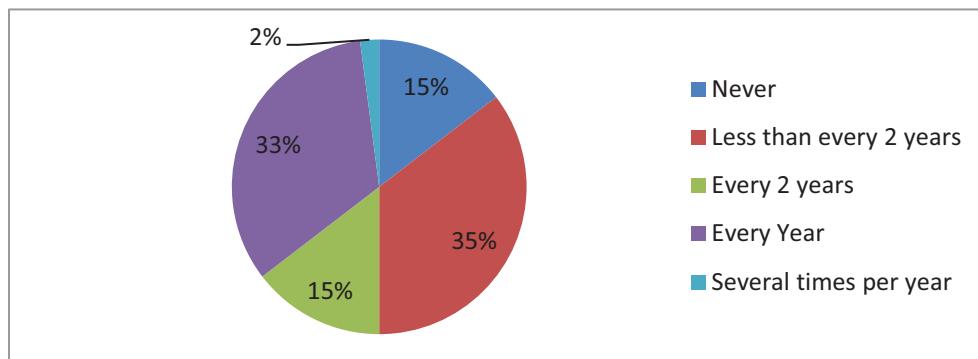

Figure 22: Results for Q12.

Two percent of organisations used this method more than once per year and 15% never used this method. This data is shown in Figure 22. Figure 23 shows the comparison of NZ and NA for this question.
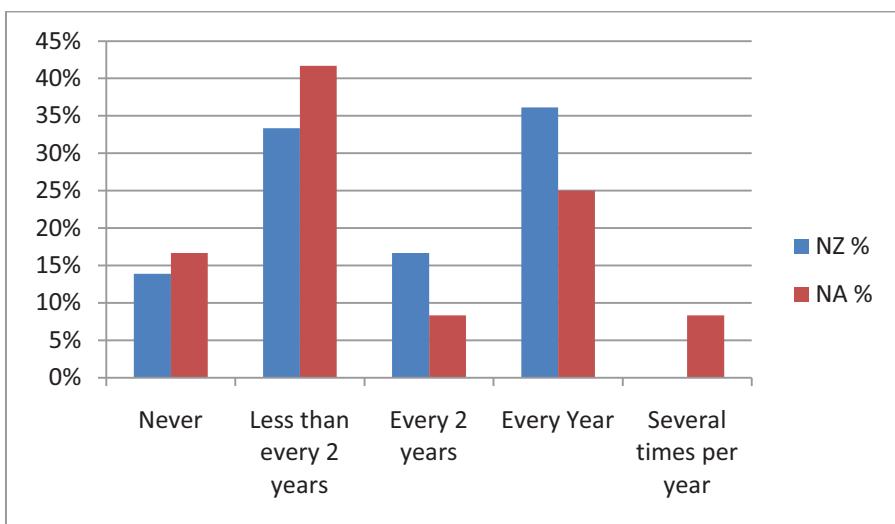
Figure 23: Comparison of NZ and NA results for Q12.

Q13.   Do the emergency management training exercises include the opening and activation of the EOC if you have one?
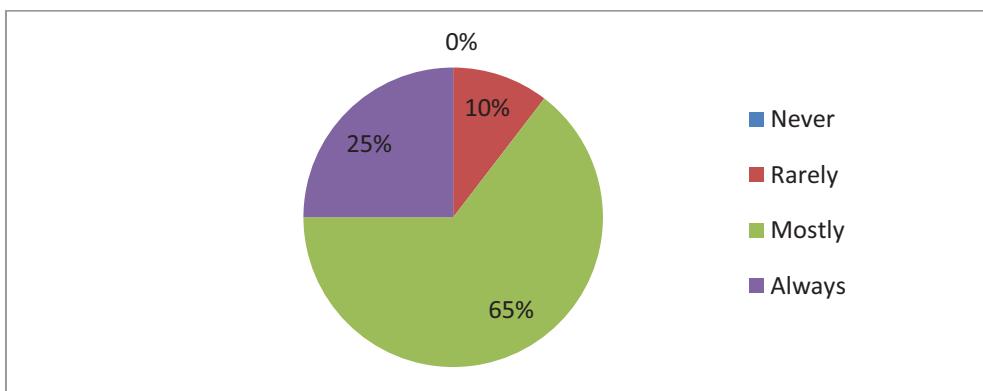

Figure 24: Results for Q13.

All organisations activated there EOC for training as shown in Figure 24. However 10% said they only rarely opened their EOC during training. Sixty-five percent said that most of their training exercises included the opening of their EOC. The comparison of NZ and NA answers are shown in Figure 25.
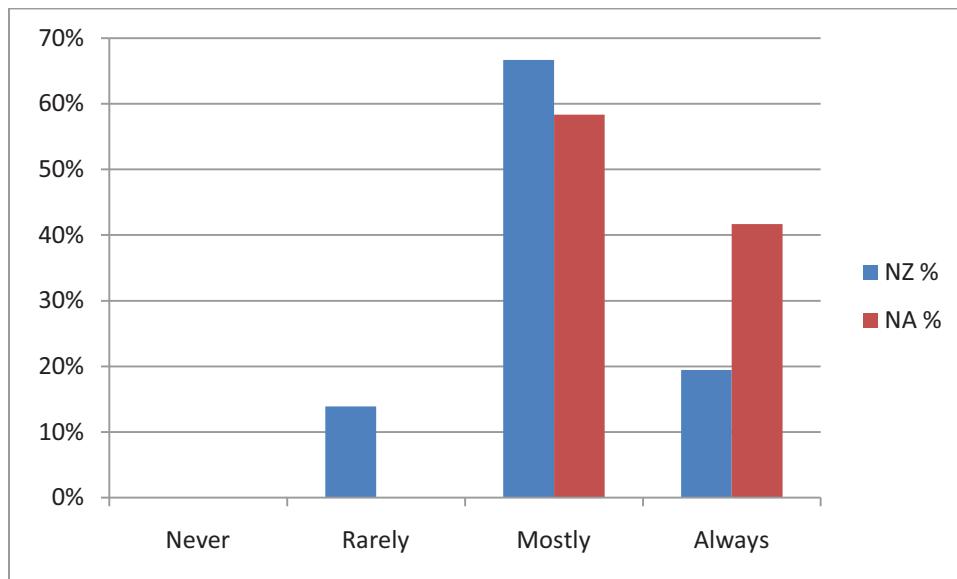
Figure 25: Comparison of NZ and NA results for Q13.

Q14. 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?

Twelve participants chose to answer this question. Most of the answers were similar or a repeat of their answers to question 6. Again for this question there is considerable variation in the answers between all of the organisations, both within NZ and NA. 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[7] 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."

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[7] Canterbury is a region of New Zealand.

"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."

Q15.   Do you assess the training methods you use to determine if training was successful?
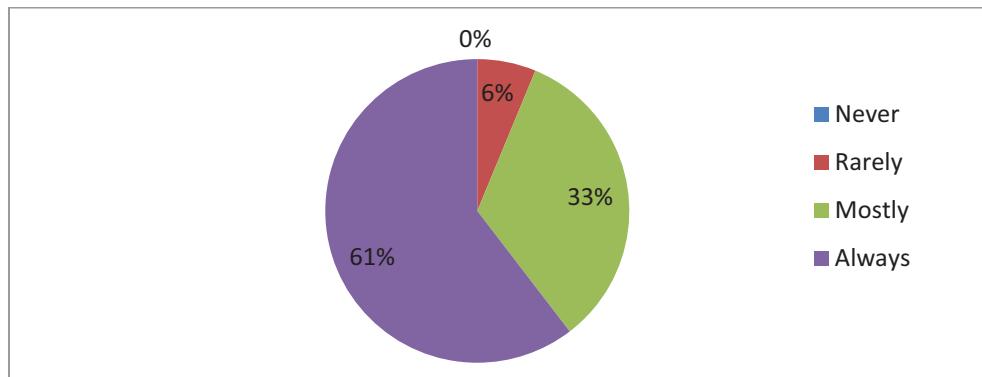
Figure 26: Results for Q15.

All organisations participating in this study at least rarely assessed the training methods that they used. Sixty percent of organisations stated that they always assessed their training methods. Thirty-three percent said they mostly did. Six percent said that they rarely assessed their training methods. This is represented in Figure 26. Figure 27 shows that NA organisations 'always assessed training' more frequently than NZ organisations.
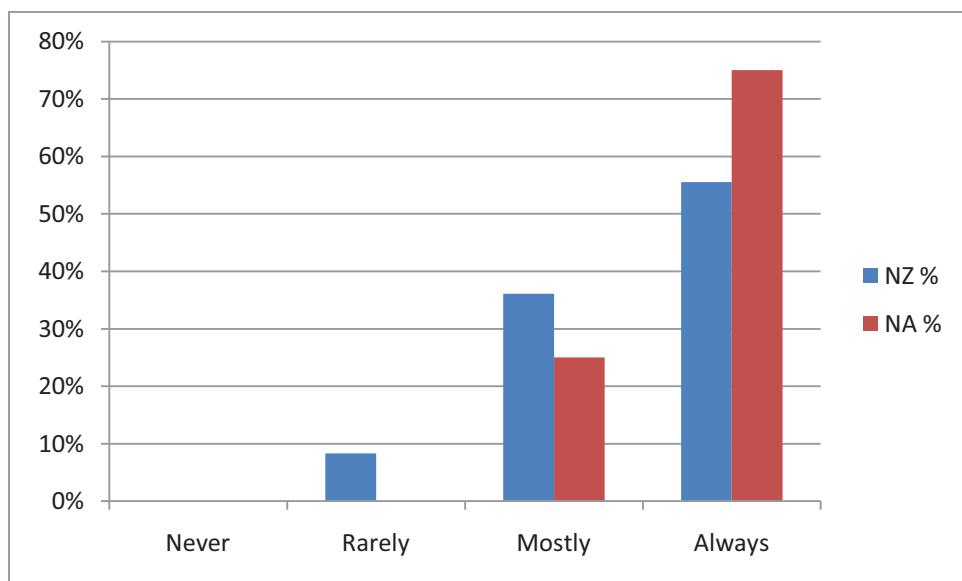
Figure 27: Comparison of NZ and NA results for Q15.

Q16.   What methods of training assessment do you use?

This question was left open because research prior to the development of this questionnaire did not indicate what types of assessment government organisations were using to assess their training and exercises (Drabek, 2003; Drabek & McEntire, 2003). Great variation was evident throughout the answers. There were 22 different categories of responses recorded from the results of this question. These are listed in Table 5.

Four participants chose not to answer this question. All of the other participants listed varied descriptions of assessment that they used. The most common response was to use participant evaluation or feedback in one way or another, either by self assessment forms after an exercise or a needs analysis of some sort, or formal or informal participant feedback. There were 14 references to this type of assessment technique. Following this there were 12 references to using debriefs with some respondents specifically referring to cold debriefs. One NZ respondent specified they used DESC[8] debriefs. There were 6 references to hot debriefs. 5 respondents referred to using independent assessors. There were 18 other responses to this question, summarised in Table 5. The category 'other' includes answers that were vague or difficult to interpret. Answers such as: *'written', 'observation'; 'otherwise we wouldn't do it that way'; 'hot wash'... 'review & analysis'* were included in this category.

General comments about the responses to this question:

The answers provided were difficult to interpret and were occasionally vague or ambiguous. In some cases it was difficult to determine exactly what the participant was referring to, for example in the answer "*reviews*" it is unclear when these reviews took place, who led them and what conclusions were drawn from them. Details for further

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[8] It is likely that DESC stands for Domestic and External Security Committee (DESC), a group responsible for the overseeing of national level response and recovery to emergencies. The committee is chaired by the Prime Minister and includes Ministers whose responsibilities are relevant to the emergency. Senior officials from those Ministries belong to a group called Officials Committee of Domestic and External Security (ODESC) who advise DESC and carry out its decisions (MCDEM, 2010b).

explanation about exactly what the respondent meant were not asked for in this
questionnaire.

Table 5: Responses to Q16

Type of response	Number of responses to type
Participant feedback/evaluation forms & needs analysis and self assessments by participants.	14
Debrief/cold debrief	12
Hot debrief	6
Independent assessors	5
Reviews, specifically after action reviews (AAR's)	5
Objectives for the training are set before the training commences	4
Internal assessment by experienced staff or peer reviews	4
Use the 2009 National Guidelines i.e. MCDEM or Homeland Security Exercise Evaluation Program (HSEEP)	4
Did not answer the question	4
National standards or qualification attainment, e.g. NZQA	3
Consulting experts, including EOC section managers, MCDEM observers, or other observers	3
Performance during real event including other EOCs reporting effectiveness of response	3
Practical exercises used as tests	2
Exercise evaluators using evaluation sheets	2
Discussions	2
Evaluation meetings with volunteers or open door policy for feedback from staff and community volunteers	2
Quizzes	1
SWOT[9]	1
Annual training survey of participants.	1
Monitoring of performance during activities	1
Post exercise report circulated to EOC staff	1
Other	4

[9] SWOT Stands for Strengths, Weaknesses, Opportunities, and Threats. It is a framework for analysing the position of a business organisation or a product in the market (Statt, 2004).

Q17. **Do you think the methods of assessment used give, an accurate account of how successful the training was?**

The participants were asked to rate their answers from 1 - not at all to 5 - yes definitely. Table 6 presents the results. Twenty-eight percent or respondents answered this question, 'yes definitely'. Thirty-six percent gave a score of 4, 32% gave a score of 3, and 4% gave a score of 2. No one answered 'Not at all', and 2% did not answer the question. Figure 28 shows a comparison of answers for NZ and NA with more NA organisations stating that the assessment methods were definitely an accurate account. Table 7 shows an example of some of the written answers for this question. The table shows participant answers for question 16 for all those participants that answered 'yes definitely' to question 17. Inconsistency is apparent between the two questions. Those organisations that indicated that they felt the assessment methods definitely gave an accurate account of successful training [Q ii] do not appear to describe robust assessment methods to [Q 16].There appears to be considerable variation in each participant's interpretation and understanding of assessment.

Table 6: Responses to question 17

| Response *n = 48*	Percentage of respondents
1 : No not at all	0
2	4%
3	31%
4	35%
5 : Yes definitely	27%
No answer	2%
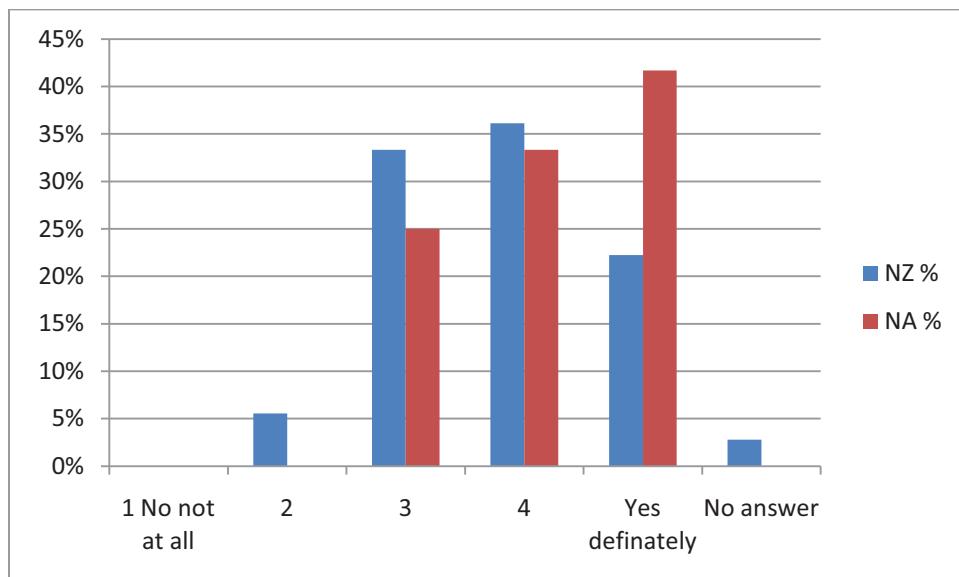
Figure 28: Comparison of NZ and NA results for Q17.

Table 7: An example of participant answers for Question 16 where the participant answered "yes definitely" to Question 17.

Quizzes, discussions, reviews, knowledge, skills and abilities

Participant feedback and exercising.
We also provide NZQA assessment for all course participants

Quick Hot debrief, plus cold debrief later & in depth after every exercise & real event. If a "real" exercise ask role playing public for their input as to the service provided.
Regular meetings with volunteer team leaders to improve systems or plan extra training to cover debrief issues.
Annual session with volunteer leaders to evaluate current years training & plan following year training programme - types, frequency, etc.
Consult EOC section Managers (all three shifts) on EOC training.

Real events

After action debriefing and review of the event. Identify weaknesses or deficiencies and follow up to correct them.

Otherwise we wouldn't do it that way :-)

Staff feedback or if a ministry ran one we have assessors in our EOC

Objectives for the training are set before the training commences. We use the evaluation tool similar to the one published in the CDEM Exercises Directors Guidelines 2009

1 - Direct feedback from participants during and on conclusion of each activity.

2 - Annual regional exercise has a hot debrief immediately on conclusion followed by a more in-depth cold debrief approx one week later when staff have had time to consider the exercise.

3 - Open door policy for feedback from staff and community volunteers.

4 - Regional level debriefs for the annual regional exercise.

External and internal evaluators and evaluations

Post exercise report that is discussed and formalized for future reference. Post exercise reports are circulated within EOC staff and to the next higher authority.

After Action Reviews, on larger exercises we use the Homeland Security Exercise Evaluation Program (HSEEP)

Q.18   Would, you or your organisation be interested in receiving more advice or guidance in the area of emergency management training?
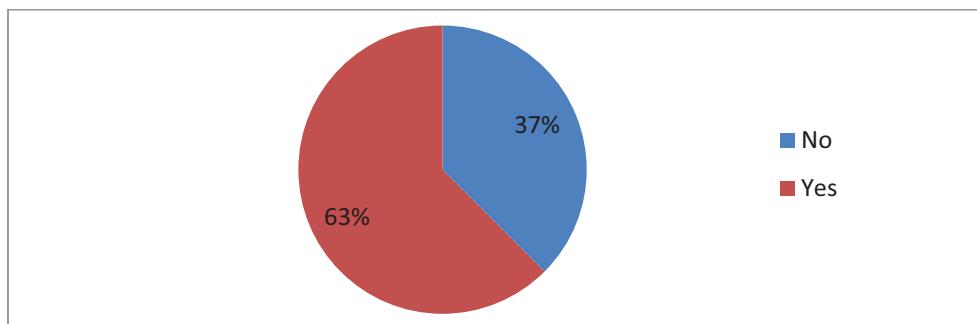

Figure 29: Results for Q18.

Sixty three percent of participants said they would like more advice or guidance in the area of emergency management training. Figure 29 shows these results. Figure 30 shows the comparison of NZ and NA as being fairly evenly distributed across the two places.
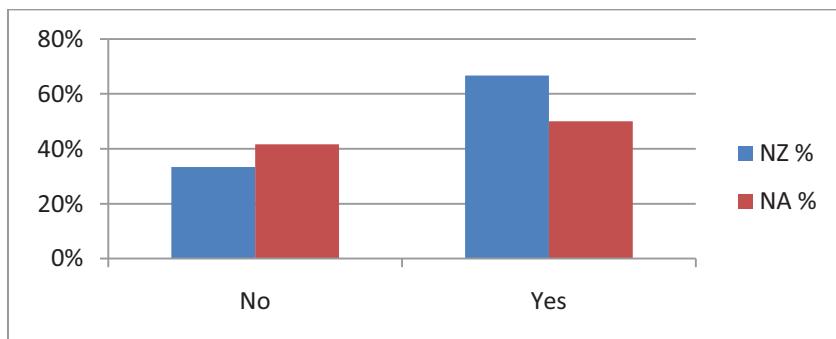
Figure 30: Comparison of NZ and NA results for Q18.

Q19.   Describe what could help:

Answers to this open ended question are summarised as follows:

- 18 participants chose not to answer this question

- 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 Colombian 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.

- There were several references to the ad hoc nature of emergency management training in NZ

Notable quotes from this question:

"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."

6.4   SECTION 3: DECISION MAKING

Q20.   In the last 5 years have you had any training about decision making in either your day to day role or an emergency management situation?
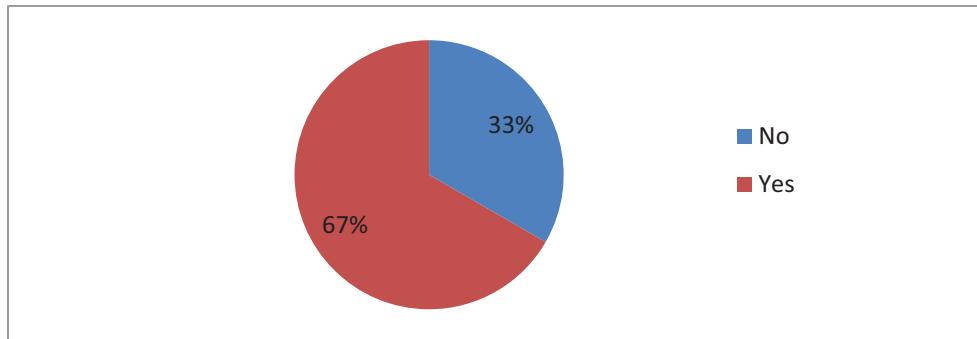

Figure 31: Results for Q20.

Figure 31 shows that 67% of participants had had decision making training in the last 5 years. Thirty three percent had not. The distribution of answers for NZ compared with NA was similar.

Q21.   If yes, please specify below what type of training it was and how decision making was incorporated into the training program:

Thirty three participants chose to answer this question. The types of training recorded by the participants for this question were diverse and varied. Table 8 shows a summary of the responses. The most common answer was for specific courses run by emergency management training organisations. There were ten references to this type of decision making training. The organisations or specific courses mentioned by participants were: "The Principal Rural Fire Officers (PRFO) training, decision making interactive seminar, leadership training thru the Emergency Management Academy of New Zealand (EMANZ) programme, a Maritime NZ Course, and a Public Lifeline Leadership Course. Following this there were nine references to nationally or federally run courses specifically for decision making. There were seven references to CIMS or NIMS training. Five respondents obtained their decision making training from universities. These certificates or degrees included subjects such as Emergency Management, Behavioural Science, Management, and Leadership and training. Four participants reported they used scenarios or exercises as decision making training or practice. Three respondents said

their decision making was part of their EOC training. One respondent had never heard of any decision making training.

Table 8: Summary of the responses to Q21

Type decision making training	Number who participated in this type of training
Specific courses run by EM training organisations.	10
Specific decision making course run by national or federal government (MCDEM, FEMA incident command structure training)	9
CIMS/NIMS training	7
University degree (not necessarily EM degrees),	5
EM scenarios or exercises to practice decision making	4
EOC training	3
Experience in the field/ Daily EM experience	3
Never heard of any decision making training	1
Other (difficult to interpret/ambiguous answers	2
Did not answer	15

Q22.   Are you familiar with any of the decision making styles listed below?

Twenty nine percent of the total responses to this question answered that they had not heard of any of the decision making styles listed and thirty-one percent responded that

they had heard of all of the styles listed in the question. There were fewer responses to each of the individual styles or a combination of one or two of the styles.

Figure 32 shows this pattern. The majority of respondents either knew all of the decision making styles or had heard of none of them. In addition, when looking at the individual data for NZ and NA the distribution of the answers follows a similar pattern.
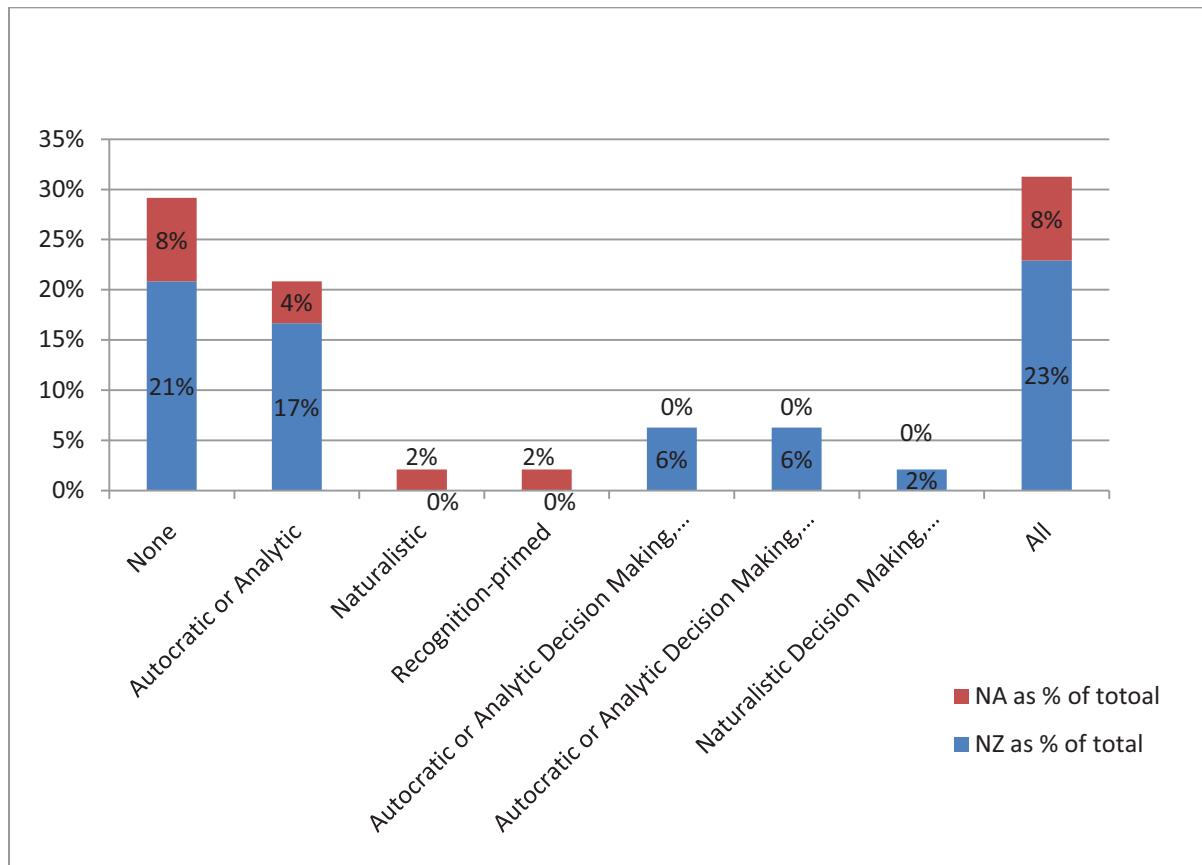

Figure 32: NZ and NA distribution as % of totals for Q22.

Q23. Would you or your organisation be interested in receiving training and practice specifically in emergency management decision making in EOCs?
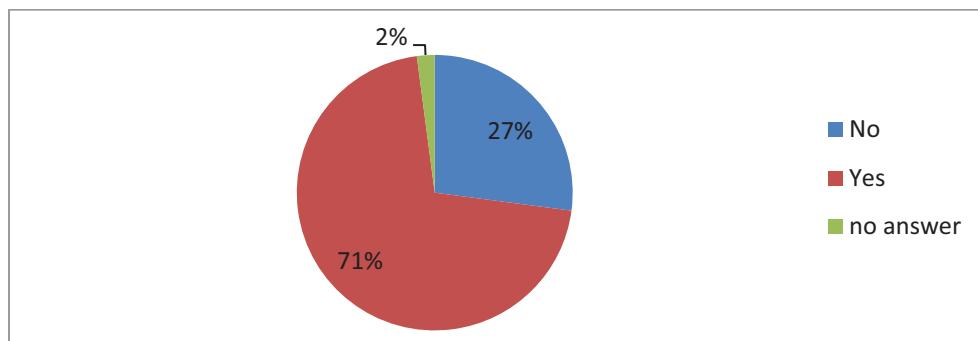

Figure 33: Results for Q23.

In this question 71% of total respondents answered yes to this question. Fifty-eight percent of New Zealand participants and 13% of North American participants said yes they would be interested in receiving training or practice specifically in emergency management decision making in EOCs. This data is illustrated in Figure 33. Table 9 also presents these figures and additionally, shows the comparison of results for NZ and NA organisations.

Table 9: Distribution of NZ and NA for Q23

	Yes	No	no answer
Total percentages for NA and NZ organisations, n = 48	71%	27%	2%
NA percentage n = 12	55%	45%	0%
NZ percentage, n = 36	78%	19%	2%

Q24.   Are there any other comments you would like to add?

Eleven respondents provided comments to this question.

Summary of their answers:

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 Super-City 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. Two respondents said that they were considerably constrained by budget. One respondent stated that they had problems with attendance to emergency management training. One respondent quoted that there was *"Definitely a need for more crisis management decision making training."*

6.5   SUMMARY OF FINDINGS

 The majority of organisations participating in this study had experienced a real emergency event within the last five years. All organisations participating in this study had an EOC and most had activated it under real emergency circumstances. It is possible that the level of real EOC activation is even greater than the results suggest due to possible misinterpretation or understanding of some questions by the participants. Either way these results indicate that for the majority of local government organisations participating in this study there is a verifiable risk of their local areas being affected by hazards.

Most organisations participated in emergency training and most of them activated there EOCs during training at least once every year or more. The training programmes varied widely from one organisation to another, both within NZ organisations, and within NA ones. In regards to exercise frequency the majority of organisations participated in tabletop, drills, and orientation exercises frequently, at least once a year or more. In most cases the EOC was activated for these exercises. 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 finding would be expected as functional and full scale exercises are typically costly and time and resource intensive (Wilson, 2000).

There was considerable variation in the description of each individual organisations training programme. All organisations at least rarely assessed their training. The majority of organisations assessed training methods regularly. When asked what methods of assessment they used there was extensive variation, ambiguity, vagueness or answers

were difficult to interpret. The most common method of assessment recorded was the use of participant evaluations and feedback. Despite these equivocal answers 64% of participants thought that the methods of assessment they used "definitely" or almost definitely (one scale point below "yes definitely") provided an accurate assessment of their training. Overall there appears to be considerable variation in each participant's interpretation and understanding of the assessment of training and exercises. Sixty three percent of participants indicated that they would like additional guidance in the area of emergency management training. There were many references particularly from New Zealand organisations to the ad hoc nature of emergency management training.

In the decision making section of the questionnaire 67% of participants stated they had undergone some sort of decision making training. When asked to describe the training their answers were wide and diverse. There were direct references to emergency management training providers, CIMS and NIMS courses and some said they learned about decision making outside the realm of emergency management, for example in unrelated courses at university. Often answers were linked in some way to an incident command structure course. When asked what decision making styles the participants were familiar with most participants either knew all of the styles listed (31%) or none of them (29%). Seventy one percent indicated they would be interested in receiving further training and practice for emergency management decision making, the highest proportion of these being from New Zealand organisations.

CHAPTER 7:   ANSWERING THE RESEARCH QUESTIONS

In this chapter the seven research questions that directed this research will be discussed with reference to the information from the literature review in Chapters 2, 3 and 4 combined with the results presented in Chapter 6.

7.1   EMERGENCY MANAGEMENT AND EOCS

1.   How often are local government EOCs activated in real emergencies?

The risk of a disaster affecting the communities that local government organisations such as city or district councils strive to protect is a very real possibility taken seriously by these organisations. Most organisations, at least 83%, that were represented in this study had experienced a real emergency event in their area in the last five years. More than 90% of organisations in this study had activated there EOC under real circumstances at least once in the last five years. In addition to this, academics such as Perry (2003) and Waugh and Streib (2006) among others as discussed in Chapters 2 reiterate that local government emergency management offices play a vital role in managing emergencies.

2.   How often are EOCs used in training, exercises and simulations?

Lee (2010) studied New Zealand CDEM Groups and said that there was considerable variation from individual performance and group performance in emergency management groups. 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. In most cases the EOC was activated for these exercises. 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 finding would be expected as functional and full scale exercises are typically costly and time and resource intensive (Wilson, 2000).

7.2   EMERGENCY MANAGEMENT TRAINING

3.   What role does the EOC play in training, exercises, and simulations and how are these training methods assessed?

The EOC of most local government organisations is frequently active during training and exercises, but to varying degrees from one organisation to another. From the findings of this research it is apparent that very little is understood about how training for each individual government organisation is carried out and even less is understood about how training or exercises are assessed. In some cases assessment is not being carried out on all training or for all exercises. Therefore it is largely unknown how effective any of the training efforts of these local government organisations are. The EOC in most organisations appears to play a fairly significant role in training and exercises. However 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.

4.   Is there a need for more research into how training is assessed and monitored within these organisations?

Literature and information supplied by national emergency management bodies such as MCDEM and FEMA (presented in Chapter 3) emphasize the importance of a complete training cycle which includes comprehensively assessing all training or exercises. The results from this study do not reflect the consistent use of adequate assessment methods for emergency management exercises. When asked about the assessment methods their answers were often vague or inconsistent. There was very little indication that New Zealand organisations were using the resources supplied by MCDEM such as the Guide to Exercises or the Debriefing Guide discussed in detail in Chapter 3. More frequently mentioned by the USA organisations was the Homeland Security Exercise and Evaluation Program (HSEEP) produced by FEMA.

The objective of training and exercises is to enhance the emergency response and recovery capabilities of the community. There is certainly a need for more research into how emergency management training is assessed and monitored within local government organisations. More specific questions about what it is that these organisations are actually doing in the way of assessing their exercises need to be asked and a more definitive answer is needed to the question:

➢ Are these exercises fulfilling their objectives?

7.3 EMERGENCY MANAGEMENT DECISION MAKING

5. What is the general understanding of emergency management decision making in local government organisations?

From the findings of this research the general understanding of decision making in emergency management appears to be wide ranging. When researching decision making in a response environment it is difficult to avoid learning about the terms naturalistic and autocratic decision making. Therefore the results of a question asking about such terms would give a fair indication of the level of knowledge of an individual. Some participants knew something about decision making styles and a similar proportion did not know anything. These results suggest that while there is information available about decision making (presented in Chapter 4) not all emergency managers are aware of the existence of this information or understand its relevance to emergency management.

In addition NDM research has been conducted in settings such as nuclear power plants, urban fire departments, command and control centres and courtrooms. It is possible that decisions made in local government EOCs would follow a similar pattern, but research has not yet provided conclusive evidence of this. It is also unknown if the pattern of decision making in EOCs is consistent from one EOC to another. When asked about what training the individual has undertaken, there were very few references to specific emergency management decision making courses, it is possible that those who did have a comprehensive understanding of decision making had gained this knowledge through non-emergency management related courses.

6.   **What is the perceived understanding of training for emergency management decision making in local government organisations in New Zealand, Canada, and the USA?**

The perceived understanding of training for decision making was found to be mixed and varied from one participant to another. Some participants indicated they knew and understood what all of the different styles of decision making were, and that they had participated in decision making training, and some did not know what any of the decision making styles were, indicating that they had not participated in even the most basic level of decision making training. Results asking about training participants undertook for decision making appeared infrequent and varied at best and in most cases there was no specific reference to any decision making courses or practices. Courses that were mentioned were often command and control based, and possibly did not aim specifically at enhancing decision making capability.

7.   **Is there a need for greater understanding of how emergency managers make decisions and are trained and practice how to make decisions?**

There is definitely a need for more research to be conducted in the area of decision making in emergency management and in particular within the responding EOC. This is reiterated by Perry (1995) who said there is very little social science data available to help emergency managers manage the EOC. The infrequency of the response circumstances does not provide regular practice for decision makers in an EOC. Training is required to teach NDM theory and exercises provide opportunity for practicing the theory. Characteristics and mechanisms of effective naturalistic decision makers were identified by Canon-Bowers and Bell 1997 in Chapter 4. These features could provide a starting point for developing specialised decision making courses for EOC personnel. Essentially EOC decision makers need to be able to develop decision making expertise without the regular experience of an actual disaster.

Seventy one percent of participants in this study said that they would like more support in the area of decision making training. There were very few references to specific courses in emergency management response decision making. Most participants referred only to general courses that may have included decision making. The results of

this study has identified a considerable gap in the understanding of how decisions are made, trained for and practiced in local government emergency response.

CHAPTER 8:   RECOMMENDATIONS, LIMITATIONS, AND CONCLUSION

8.1   INTRODUCTION

The two research objectives were to conduct preliminary exploratory research about how local government organisation EOCs are used, and to contribute information that could better equip emergency managers to prepare for and respond to emergencies and disasters. Therefore there are two perspectives for the recommendations that conclude this thesis. The first is the academic perspective with recommendations for future research and the second is the emergency management perspective with recommendations for government organisations. Following the recommendations is a brief section explaining the limitations of this research and how a more comprehensive questionnaire and interview process would provide further insight into emergency management in government organisations. Finally the conclusion of this chapter presents a summary of the major findings and the closing comments for this thesis.

8.2   RECOMMENDATIONS FOR FUTURE RESEARCH

This thesis 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, what exercises they participate in, and how they learn and practice decision making in the response environment. 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 enhance 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 local government organisations want or need more national guidance and standardization for training and exercise programmes?

- ➤ How are local government emergency management training and exercises assessed?

- ➤ How effective are these assessment methods at finding out if the training or exercise objectives were achieved?

- ➤ How effective are the training and exercises that local government organisations participate in at improving response capabilities?

- ➤ The Incident Command System is a dominant feature within training and exercise programmes. Does this system actually enhance response capability in a responding EOC?

Decision making in emergency management response

➢ How is the decision making process currently incorporated into the training programmes for emergency managers and EOC personnel?

➢ How can emergency managers be prepared for and trained to make better decisions in the responding EOC?

8.3 RECOMMENDATIONS FOR LOCAL GOVERNMENT

Answers to the research questions above would help develop more proficient preparedness activities. Nevertheless research takes time. The following recommendations are simple actions that could be implemented by any level of government organisation in the immediate future.

Emergency management and EOCs

- Consider how to better utilise the EOC during training and exercises.

- Critically evaluate the use of incident command systems within the EOC.

Emergency management training

- Conduct a critical review of the assessment methods of training and exercises.

- Ensure local government organisations are aware of and have access to resources such as the Guide to Exercises and Debriefing guide produced by MCDEM.

- Set clear objectives for every training session or exercise and ensure these objectives are reviewed and recorded on completion of every session or exercise.

Decision making in emergency management response

- Provide key staff of local government EOCs with specialized decision making training and the opportunity to practice these skills.

8.4   LIMITATIONS OF THIS RESEARCH

The most significant limitation of this research was the small sample size. There were 36 out of a total of 73 New Zealand organisations that participated in this research and 12 North American organisations. Despite the small sample size the study did shed light on current preparedness activities of local government organisations. In order to gather more conclusive evidence a more in-depth study with a larger sample of participating organisations would be required. The questionnaire used in this study was designed to identify areas of interest for future research. The questions used were, on some occasions, not specific enough to obtain an accurate or detailed representation of EOC use, training, or decision making. Inconsistencies in some of the participant's answers were identified and have been documented in Chapter 6. It is possible that in these instances these questions were misread or misinterpreted.

Along with the questionnaire each participant received a definition sheet [Appendix B]. 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 could have given a misrepresentative answer to some questions. A follow up interview after each questionnaire would clarify these answers and provide more detailed information. A more comprehensive questionnaire and interview process with more specific questions based on the recommendations of this thesis will provide a clearer picture of emergency management preparedness activities in local government organisations.

8.5   CONCLUSION

Following the volcanic eruptions of Mt Ruapehu, Paton et al., (1998) discovered that the effectiveness of an integrated response was hindered by communication, coordination, training, and organisational constraints. The investigations of this thesis looked at some of these factors in detail involving the role that the local government organisations play in preparedness and response. Local government organisations are predominantly aware of the risks from hazards that their communities face. In New Zealand, legislation mandates the existence of an EOC, the existence of a training and exercise programme and stipulates the importance of monitoring and evaluating the programme (MCDEM, 2002; McEntire & Myers, 2004). However, results from this research indicate that these three concepts are disconnected in practice. Perry (1995) writes that there is little social scientific data available to guide emergency managers in the operations of EOCs. In agreement with Perry results presented in this thesis reveal that local government organisations want and need more information and guidance in emergency management training and decision making. Research needs to provide this information and the greater emergency management community need to support and guide local government organisations.

All organisations that took part in this study participate in preparedness activities to some degree, all had an EOC, and all had active training programmes and were involved in regular exercises. The underlying question still to be answered, however, is to what extent these activities are enhancing response capability. Literature readily documents the importance of preparedness activities such as training and exercises. National governments mandate that training and exercises be conducted by local government organisations, but how this is to be carried out is vague, with little guidance or standardisation. What each individual organisation does by way of training and the assessment of the training is unique to each organisation. Training programmes need to include all aspects of Wilson's (2000) training schematic and MCDEM's (2009) exercise cycle. It is apparent that at least in some organisations the monitoring and evaluation aspect of this cycle has been overlooked and that organisations are operating in blind faith that their preparedness activities are actually working. Thomas et al., (2004)

supports this stating that there is a growing realisation that nearly all currently accepted disaster preparedness practices are based largely upon anecdote and are lacking systematic study or objective validation.

The findings of this thesis have identified some disparity between recent research and the practices of local government organisations. An example of this is the use of the incident command system in EOC operations and training. Chapter 2 presented conflicting opinions of the usefulness of this system in an emergency management context. Incident command systems provide structure and theory that simplifies training programmes and gives solid foundations for local government organisation management frameworks (McEntire & Myers, 2004). On the other hand however, it is largely unknown how beneficial these systems are in practice. 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 & McEntire, 2003; McEntire & Myers, 2004). More conclusive research is required to discover how beneficial ICSs are when applied to the EOC environment. The first major assessment of NZ national CDEM capability since the CDEM Act's implementation in 2002 is due for completion in 2011 (Lee, 2010); in addition with the research from this thesis a picture of the gaps in emergency management knowledge is beginning to present itself.

Another example of the gap between academic emergency management literature and practice is evident in decision making. Chapter 4 presented a summary of the different approaches to decision making such as the analytical and naturalistic approaches. Characteristics and mechanisms of successful decision makers in a naturalistic environment were listed by Canon-Bowers and Bell (1997). Are these characteristics and mechanisms being sought out and developed during training and in practice exercises? At this stage the answer to this is unknown. The general impression gained from the results of this research is that there is limited opportunity for emergency managers to develop and practice their decision making skills for response. Also supporting this claim was the research presented by Paton and Jackson (2002).

It is possible that there is heavy reliance on teaching incident command systems in training and these systems may be contributing to perceptions of enhanced decision making capability in emergency managers and EOC staff. McEntire and Myers (2004) claim that these systems fail to incorporate the human elements of decision making, where for example, the decision maker performs using his or her individual resiliency, expertise, and experience. The challenge in training for decision making is finding the balance between policy, planning, and procedures, and knowing when to be flexible adaptable, and innovative. Research proving the effectiveness of using incident command systems in the EOC and to teach decision making capability is largely inconclusive (Buck et al., 2006; Handmer, 2008; McEntire & Myers, 2004; Waugh & Streib, 2006). More investigation is required into how decision makers can gain experience in responding to disasters.

MCDEM provide a guide for exercises which includes a brief section on debriefing and they also produce a more comprehensive guide specifically for debriefing to be used for both real events and exercises. While these resources exist it is unknown how much they are being used by CDEM Groups or if they are effective. In addition to MCDEM's guidelines there are other methods of assessment available, such as Paton and Jackson's Assessment Centre approach. Schaafstal et al., (2001) draw attention to the implications of assessing training in emergency management. They state that the lack of valid, reliable, and automated team performance measurement tools has resulted in an inability to assess and diagnose large scale team training effectiveness, and consequently measures of performance are not available. After carrying out research for this thesis it was discovered that there was very little information available specifically for the assessment of training in emergency management and even less for exercises based around EOC activation. The assessment of training and exercises needs to establish with some certainty that the desired objectives have been achieved.

The importance of the local government EOC and the central role it plays in managing an emergency is undisputed. Research required 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. Paton and Jackson

(2002) suggested the use of an assessment centre as a training and development resource. The EOC could facilitate the assessment centre approach providing a central point for training operations as well as for responses in real emergencies. This idea could be further expanded to set up experimental testing methodology for the current systems used in EOCs. Trinka and Jenvald (2006) also give suggestions saying the use of role-playing and exercises would be feasible method for investigating command and control work and how real decision makers operate.

Local government organisations play a critical role in achieving community resilience to disasters. 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.

APPENDIX A

COPY OF THE QUESTIONNAIRE SENT TO EMERGENCY MANAGERS

Hello my name is Helen Sinclair I am a Masters student at Massey University, New Zealand. Your organisation has been invited to participate in this emergency management study. If you choose to participate the questionnaire should take no longer than 15 minutes to complete. Answering any of the following questions is optional and all data will remain confidential and be destroyed at the end of the study. There is a consent form at the back of this questionnaire, by signing this you allow me to use this data in my thesis. The data collected here will contribute to my Master's Thesis about Emergency Operations Centres (EOCs). This study aims to find out if organisations have an EOC and, if they do, how often it is used for training or real events. The questionnaire also contains sections focusing on decision making training for EOC personnel, and whether there is a demand for more training about decision making processes to improve preparedness for emergency events. Further training and simulation exercises may be developed as a result of the feedback to this questionnaire. You are under no obligation to accept this invitation. If you decide to participate, you have the right to: 1) decline to answer any particular question; 2) withdraw from the study; 3) ask any questions about the study at any time during participation; 4) provide information on the understanding that your name will not be used unless you give permission to the researcher; 5) be given access to a summary of the project findings when it is concluded. Instructions: 1. Read and answer each question that applies to your organisation, answer all three sections. 2. Refer to the definition sheet attached with this questionnaire if required. 3. Return the completed questionnaire to the researcher. Thank you for your support. Kind regards, Helen Sinclair Helen@helensinclair.com

* Required

i) Please write the name of your organisation below: *

ii) Can you name or describe any real civil defence emergency management events that have taken place in your organisation's local area over the last 5 years?
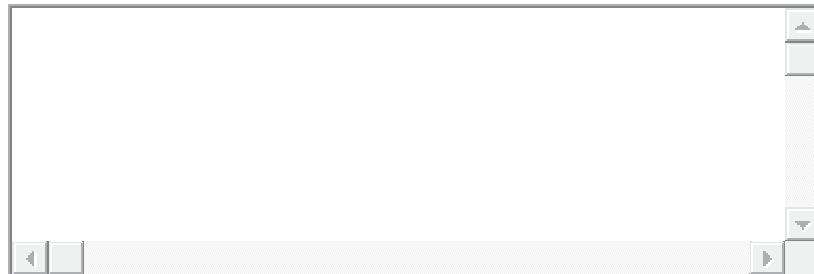
SECTION 1: EMERGENCY OPERATIONS CENTRES (EOCs)

Refer to the definition sheet attached for an explanation of what an EOC is. (If you answer no to this question go straight to Section 2)

1. Does your organisation have an EOC? *

○ Yes

○ No

2. How often has the EOC been activated under real circumstances in the last 5 years?

○ Never

○ Once

○ Twice

○ 3 - 4 times

○ 5 or more times

3. Can you name or describe some of these events? Write your answers below if you have not already described these events in the above question
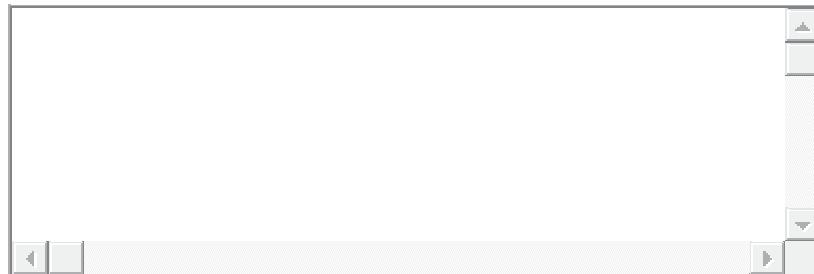
4. Does the EOC activate for emergency management training or simulations?

   ○ Yes

   ○ No

5. If so how often do the training or simulations in the EOC occur?

   ○ Never

   ○ Less than once every 5 years

   ○ Less than once every 2 years

   ○ Every two years

   ○ Every year

   ○ Several times per year

6. Ideally I would like you to detail the training program your EOC follows if you have one. How often does training occur, and what type of training or simulation is it? What is the frequency of each type of training?
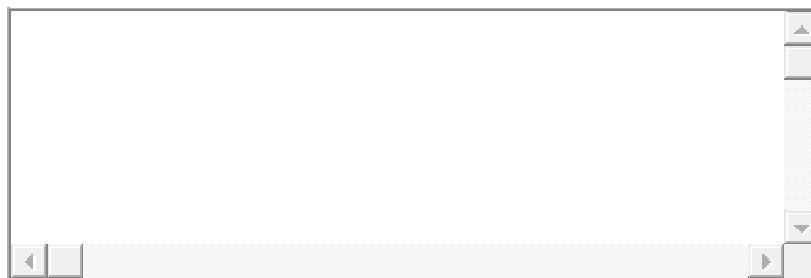
SECTION 2: CIVIL DEFENCE EMERGENCY MANAGEMENT TRAINING
Refer to the definition sheet for definitions of the exercise types. (If you answer no to this question go straight to section 3)

7. Does your organisation participate or conduct civil defence emergency management training or simulations? *

   ○ Yes

○ No

8. Does your organisation use Tabletop exercises as a training method?

○ Never

○ Less than every 2 years

○ Every 2 years

○ Every year

○ Several times per year

9. Does your organisation use Drills as a training method?

○ Never

○ Less than every 2 years

○ Every 2 years

○ Every year

○ Several times per year

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

○ Never

○ Less than every 2 years

○ Every 2 years

○ Every year

○ Several times per year

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

○ Never

○ Less than every 2 years

○ Every 2 years

○ Every year

○ Several times per year

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

○ Never

○ Less than every 2 years

○ Every 2 years

○ Every year

○ Several times per year

13. Do the emergency management training exercises include the opening and activation of the EOC if you have one? Check the answer that applies in regards to your above answers

○ Always

○ Mostly

○ Rarely

○ Never

14. 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. Include: How often does this training occur? What type of training or simulation is it? What is the frequency

of each type of training? Or use this space to add any other detail.

[text box]
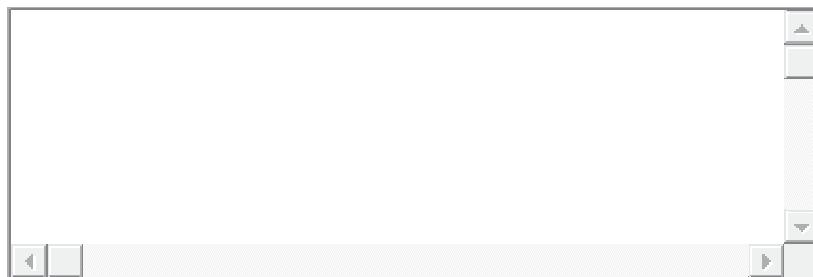
15. Do you assess the training methods you use to determine if training was successful?

○ Always

○ Mostly

○ Rarely

○ Never

16. What methods of training assessment do you use?
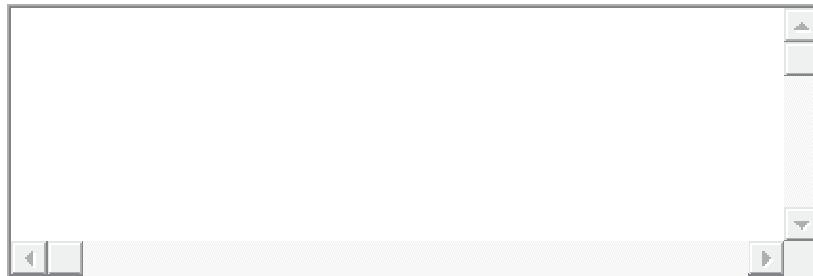
[text box]

17. Do you think the methods of assessment used give an accurate account of how successful the training was? Chose from the scale below

                 1   2   3   4   5

No, not at all ○   ○   ○   ○   ○   Yes definitely

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

○ Yes

○ No

19. Describe what could help:

```
[text box]
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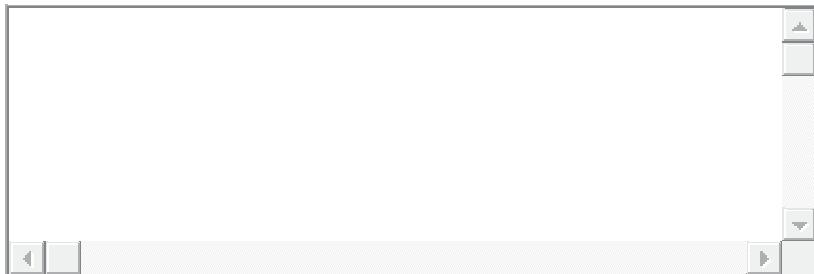
SECTION 3: DECISION MAKING

20. In the last 5 years have you had any training about decision making in either your day to day role or an emergency management situation? *

○ Yes

○ No

21. If yes, please specify below what type of training it was and how decision making was incorporated into the training program:

```
[text box]
```
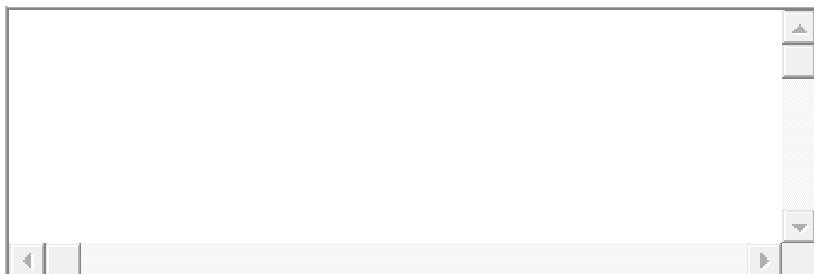
22. Are you familiar with any of the decision making styles listed below? Please check against those that you are familiar with.

☐ Autocratic or Analytic Decision Making

☐ Naturalistic Decision Making

☐ Recognition-Primed Decision Making

☐ None of these

23. Would you or your organisation be interested in receiving training and practice specifically in emergency management decision making in EOCs? *

  ○ Yes

  ○ No

24. Are there any other comments you would like to add?

Do you agree to participate in this study under the conditions set out in the email sent with this questionnaire? *

  ○ I agree

  ○ I do not agree

Submit

APPENDIX B

DEFINITION SHEET FOR EMERGENCY MANAGEMENT QUESTIONNAIRE

This section provides definitions you may want to refer to while answering the questionnaire. The terms are arranged in the order they appear.

Emergency Operations Centre (EOC)

Emergency Operating Centres (EOCs) are the key facilities officials use to manage disaster response. Within EOCs, managers coordinate tasks and activities, make policy, communicate information internally and externally, disperse information, and host visitors. The EOC is the central direction, control, and coordination point for emergency operations.

The EOC facility is where key decision makers gather information and assess policy options regarding the event. It is the place to decide what specific information should go to persons carrying out an emergency service operation. It supports field operations for emergency service and other disaster personnel and agencies by acquiring needed resources.

The community EOC is best seen as an over-arching organization into which information from more specialized EOCs – such as those operated by fire and police departments – flows, and from which the overall response to the disaster is directed.

(McEntire, 2007; Neal, 2005; Perry, 1995)

QUICK Reference table for types of Emergency Management Training:

	Orientation	Table Top	Drill	Functional	Full scale
Format	Lecture or seminar discussion based on scenario	Seminar discussion with problems interjected by message	Practice by a part of an agency or system in use of actual equipment	Practice by a function of the system in the use of full procedures and facilities	Complete simulated emergency with movement of actual resources to solve physical problems
Example	Setting up a mock welfare centre, and walking staff through how it is organised.	Participants discuss their response to a tsunami threat to a particular area, where the only injects are Tsunami Bulletins, Watches or Warnings from the Pacific Tsunami Warning Centre in Hawaii, describing the nature of the threat.	Activating an emergency operations centre or using alternative communications (such as radios).	A multi-agency response to extensive flooding, where evacuation of a settlement is required. Messages and injects are provided by exercise control and are handled by the participants in the way described in appropriate plans and procedures. Outcomes are generated that would be expected in a real situation.	An airport incident with volunteers portraying 'victims' and the emergency services using real rescue equipment at the scene. Coordinated, multi agency response to the event is exercised.

Types of Emergency Management Training (Green, 2000; MCDEM, 2009)

Orientation

This type of exercise is used to familiarise the players with the activity. It could be in the form of a lecture, seminar, or discussion. It can also be referred to as a '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.

Tabletop

A tabletop exercise may also be referred to as a 'discussion exercise'. It is a seminar discussion with problems interjected by message. Participants are presented with a situation or problem that they are required to discuss and 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.

Drill

Is an exercise where staff physically handle specific equipment or perform a specific procedure. The exercise usually has a time frame element and is used to test the procedures.

Functional

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 e.g. direction and control, resource management and communications.

Full scale exercise

A full scale exercise may also be referred to as a 'practical' or 'field' exercise. These include the movement or deployment of people and resources to include physical response 'on the ground' to a simulated situation. They can be 'ground' focused only or may include the higher level response structures, and 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.

Decision Making Terms:

In theory there are two basic types of decision making. An analytical style, based on weighing up the different options and naturalistic decision making, a faster more intuitive type of judgement that relies upon experience (Flin, 1996).

Autocratic/analytic decision making style

Analytical decision making in its simplest form begins with the identification of a problem and the generation of options for solving the problem. This is followed by the evaluation of each of these options using evaluation strategies such as the weighting and comparison of the relevant impacts or benefits of each option. A choice is then made and implemented based upon these characteristics. Theoretically, this analytical approach is the best decision making method, if there is unlimited time, mental energy, and 'perfect' information available (Flin, 1996)

Naturalistic decision making

Naturalistic Decision Making is the study of how people use their experiance to make decisions in field settings (Flin et al., 1997). It is a faster more intuitive type judgement than analytical decision making that relies on experience. Within the field of naturalistic decision making the 'Recognition-Primed decision making model describes how experianced decision makers can rapidly decide on the appropriate course of action in high-pressure situations. (Flin, 1996)

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