Disaster Prevention and Management

Emerald Article: Assessing emergency management training and exercises
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Article information:
Permanent link to this document: http://dx.doi.org/10.1108/09653561211256198
Downloaded on: 30-10-2012
References: This document contains references to 32 other documents
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Assessing emergency management training and exercises

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Abstract

Purpose – The purpose of this paper is to investigate how training or exercises are assessed in local government emergency management organisations.

Design/methodology/approach – An investigative review of the resources available to emergency managers across North America and within New Zealand, for the evaluation and monitoring of emergency management training and exercises was conducted. This was then compared with results from a questionnaire based survey of 48 local government organisations in Canada, USA, and New Zealand. A combination of closed and open ended questions was used, enabling qualitative and quantitative analysis.

Findings – Each organisation’s training program, and their assessment of this training is unique. The monitoring and evaluation aspect of training has been overlooked in some organisations. In addition, those that are using assessment methods are operating in blind faith that these methods are giving an accurate assessment of their training. This study demonstrates that it is largely unknown how effective the training efforts of local government organisations are.

Research limitations/implications – Further study inspired by this paper will provide a clearer picture of the evaluation of and monitoring of emergency management training programs. These results highlight that organisations need to move away from an ad hoc approach to training design and evaluation, towards a more sophisticated and evidence-based approach to training needs analysis, design, and evaluation if they are to maximise the benefits of this training.

Originality/value – This study is the first investigation to the authors’ knowledge into the current use of diverse emergency management training for a range of local government emergency offices, and how this training impacts the functioning of the organisation’s emergency operations centre during a crisis.

Keywords Emergency management, Emergency measures, Training, Assessment, Monitoring and evaluation local government, Local government, United States of America, New Zealand, Canada

Paper type Research paper

Introduction

Natural, technological, and terrorist disasters occur within the sphere of responsibility of one or more local governments (Perry, 2003). In New Zealand, Canada, and USA, emergency management capacity is built from the grass roots level upwards (Federal Emergency Management Authority (FEMA), 2008; JIBC, 2002; MCDEM, 2007), thus local governments have principal responsibility for disaster mitigation and preparedness (FEMA, 2008). Consequently, responsibility for managing hazards...
when they do occur is most often in the hands of local officials (Waugh and Streib, 2006). The quality of the response and recovery efforts is thus directly linked to the knowledge and skills possessed by staff working at disaster sites (Schaaftal et al., 2001) and their ability to put them into practice in a range of hazard events. A key issue is how the requisite knowledge and skills, as well as people’s ability to use them, are acquired. While training and exercising are vital tools in this context in all high-risk professions, the fact that disasters are infrequent makes training and exercising especially important in emergency management.

Planning is the fundamental backbone of developing a coherent training programme that can be conveyed to those who will be called upon to respond to disaster (Paton and Jackson, 2002; Perry and Peterson, 1999). Ensuring that training provides a return on investment for communities, responders, and organisations makes including an evaluation component in the planning process essential (Wilson, 2000). Developing a cost-effective training programme calls for particular attention to be paid to the design and conduct of training programmes. The infrequent nature of hazard events creates problems for the training needs analyses that would normally underpin this process and results in needs having to be estimated based on anticipated demands derived from what organisations will have to do to develop competent responders (Paton et al., 1999).

For example, in New Zealand, city, district, and regional councils are required under the Civil Defence Emergency Management Act 2002 (CDEM Act) to be able to coordinate multi-agency planning and activities in preparation for responding to the impacts of any possible hazard. For most organisations this includes being able to open and operate emergency operations centres (EOC) that function as the command and communication headquarters for planning and decision making (Perry, 1995). EOCs thus act as over-arching organisations that coordinate information from more specialized EOCs and operational groups (e.g. fire and police departments) and use this to direct and coordinate the overall response to the disaster (Perry, 1995). From analyses of these requirements it is possible to develop understanding of the skills and competencies training must develop. It is also important to consider who is to be trained. Personnel in a local governmental EOC are typically at the forefront of response management in disasters. For this reason local government organisations were selected for this research.

Emergency management activities are undertaken in unique and challenging circumstances (e.g. responding to novel events characterised by multi-agency involvement). Anticipating these circumstances provides the foundation for identifying the competencies, systems, and procedures required to coordinate and manage response (Drabek and McEntire, 2003; Perry, 1995; Thomas et al., 2004). It is not just operational issues that need to be considered. The opening and commencement of EOC activities is central to training exercises (Sinclair, 2011). It is therefore important that local government organisations and personnel operating within the EOC understand the assessment methodologies available for evaluating and monitoring exercises and which can serve to provide input into future training needs analyses (Paton et al., 1999). This paper presents a review of the literature surrounding emergency management training and assessment materials to identify resources available and critically evaluates the practical utility of this information as a basis for EOC training through the conduct of a survey of 48 local government organisations located across North America and within New Zealand.
An investigative review of emergency management training, exercises and assessment materials and guidelines

Training is the systematic acquisition of knowledge, skills, and attitudes with the goal of developing competencies necessary for effective performance in work environments (Salas et al., 2006). Emergency management training is intended to develop people's capacity to respond to the new and atypical demands presented by a disaster, as well as developing norms of carrying out a job or exercising a specific skill. Training should incorporate key officials and must focus on the procedures that will take place in the EOC (McEntire and Myers, 2004).

A good introduction into what is required of a comprehensive training programme is shown by Wilson's (2000) basic training schematic that identifies seven steps, as follows:

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; and
7. audit the process for future modification.

This schematic presents the general process of training to the point of uncovering who needs to be trained and in what topics. While training needs analysis and design are commonly occurring organisational activities, it is important to take into account the specific challenges of performing these activities for emergency operations centres. For example, training needs analysis usually takes place in a context in which job performance can be regularly observed. The infrequent nature of hazard events and the complex and unpredictable nature of hazard events means that job performance cannot be observed. Consequently, novel approaches to training needs analysis and exercise design are required (Paton et al., 1999; Paton and Jackson, 2002). Steps 1-5 identify who needs to be trained and the knowledge, skills, and attitudes that should be instilled in people and groups. In all organisations the evaluation process outlined in Steps 6 and 7 are important in ensuring cost effectiveness and identifying future needs. This is equally true for emergency management training. However, the infrequent nature of disasters means that emergency management training must include mechanisms that substitute for the practice and experience afforded by working life in most organisations. This involves exercising. It follows that evaluation of these exercises is crucial.

Emergency management exercising

Most industrialized countries have mandates concerning exercises, which underscore their pivotal role in the preparedness process (McEntire and Myers, 2004). Exercises are an integrated part of training and are defined as an activity that stimulates a situation in order to test procedures and provides practice for participants in defined roles (MCDEM, 2009, p. 59), they also provide experience in dealing with high-pressure situations in a safe and supportive environment (Paton et al., 1999). This not only allows technical and managerial skill development but also lets the individual know
how they are likely to react to stressors and how to minimise negative reactions. Simulation exercises provide the only experiential means by which to train people in an environment that is as realistic as possible for an unknown crisis (Borodzicz and van Harperen, 2002). It is their evaluation that provides opportunities to test both the effectiveness of emergency plans and the abilities of personnel to execute them (Perry and Peterson, 1999; Trinka and Jenvald, 2006).

To guide the evaluation process, the FEMA developed the Homeland Security Exercise and Evaluation Program (HSEEP) (FEMA, 2010), which provides a national standardized methodology and terminology for assessment, similar to that adopted in New Zealand by MCDEM (2009) as illustrated in Figure 1.

**Training assessment: monitoring and evaluation**

Assessment processes function to enhance organisational learning in relation to expected improvements in capacity and capability, and support substantive accountability in ways that contribute to overall emergency management effectiveness and informed decision making (Borodzicz and van Harperen, 2002; MCDEM, 2010). Assessment incorporates two concepts: monitoring and evaluation. Monitoring is a continual process that provides indications of compliance with responsibilities, and progress, or lack thereof, in the achievement of results. Evaluation measures effectiveness by comparing actual with intended goals, objectives, and targets. It provides a systematic context for interpreting these differences (MCDEM, 2010, sheet 2), providing a foundation for future training needs.

Assessment processes thus complement the conduct of Fagel’s (2010, p. 280) evaluation criteria:

- whether the exercise has achieved its objectives;
- needed improvements in plans, procedures, or guidelines – or the emergency management system as a whole;
- training and staffing deficiencies;
- equipment needs;
- need for additional exercising; and

**Figure 1.**

Exercise development cycle

Source: MCDEM (2009, p. 10)
the evaluation team leader – responsible for evaluation methodology, selection and training of an evaluation team and report preparation.

The assessment of training and exercises is not to be confused with the overall assessment of response capabilities of an organisation. The exercises themselves represent means of testing and evaluating plans or training. However, the exercise itself also needs to be evaluated to complete the exercise cycle. There is limited research available that provides evidence of how well exercises enhance capability in local government EOCs. Emergency management exercises and crisis simulations are somewhat unique in that effectiveness cannot be gauged against other modes of training, or performance against actual crisis events (Borodzicz and van Harperen, 2002). To examine this issue it is first necessary to consider how assessment can be undertaken to expedite evaluation.

Methods of assessment. Exercise guidelines produced by, for example, New Zealand’s MCDEM identify debriefing processes that can be applied prior to and post emergencies, disasters and exercises (MCDEM, 2006, 2009). A post exercise debrief is defined as a critical review of the entire exercise and is conducted to identify those areas that were handled well, those areas where issues were experienced and identifies recommendations for improvement (MCDEM, 2009, p. 59). 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 and 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 that arise from the achievement or non-achievement of objectives are recorded, good performance is acknowledged, and constructive information from those being debriefed is sought. 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, 2006).

MCDEM (2009, p. 59) recommends that two different debriefs be conducted after an exercise; a hot debrief and a cold debrief. A hot debrief occurs immediately after an exercise. It is an opportunity for participants to provide feedback while the exercise is still fresh in their minds. A cold debrief is a more formal debrief held four to six weeks following the exercise in order to evaluate the exercise’s effectiveness, issues, successes, and problems (MCDEM, 2009, pp. 7-6). Cold debriefs involve an internal organisational debrief, focusing on internal operations, and a multi-agency debrief that focuses on the effectiveness of inter-agency coordination (MCDEM, 2006). Having determined the broad objectives of evaluation, the next step is to identify how it should be conducted. Thiagarajan (1993) argued that a structured format, using a standard set of questions, is more effective. He suggests examples of ways to debrief include guided, mediated, and video supported debriefing, debrief games, journal writing, questionnaires, panel discussions, and dialogues (as cited in Borodzicz and 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 in order to better capture the diverse nature of the knowledge, skills, and attitudes that contribute to effective performance in an EOC context, and usually also involve the observation
and evaluation of performance against predetermined task-related behaviours by a team of trained assessors (Ballantyne and Povah, 2004). Assessment centres can allow both specific aspects of complex and multi-faceted emergency management roles and tasks to be developed and practiced 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 and 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 and Jackson, 2002, p. 120).

Fagel (2010) recommends an exercise evaluation team be used during the exercise design phase. Evaluators should have the expertise to offer detailed, critical feedback and preferably have the authority to ensure that issues identified by participants and by the evaluation process are incorporated into organisational practices or in future exercise design (Paton et al., 1999). This activity corresponds to using subject matter experts in assessment centres and in the application of the critical incident method to training needs analysis.

Implications of using and assessing exercises. Exercising provides opportunities to test the knowledge, skills, and the abilities of first responders and government officials, assess participant perceptions of teamwork, training adequacy, response network effectiveness, job risk, and equipment adequacy (McEntire and Myers, 2004). They can also be used to develop stress resilience and competency in new decision procedures and in distributed decision making (Paton et al., 1999). Perry and Peterson (1999) identified that the link between exercise participation and perception of planning adequacy was equivocal. Some of the reasons for this derive from a failure to attend to the unique nature of the training and organisational needs analyses required to develop effective exercises (Paton et al., 1999). Organisational needs are generally neglected, as the focus is predominantly on staff. However, this neglects the fact that training is enacted in organisational settings and is influenced by the characteristics of organisational culture that are implicit aspects of job performance (Paton et al., 2009).

Borodzicz and van Harperen (2002) raise the issue that observers may learn differently from participants in the exercise. Learning outcomes may be 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. They say that steep learning curves were shown when trainees were both facilitator and participant. Schaafstal et al. (2001) also draw similar conclusions highlighting that training is not always based on learning objectives developed from analysis of the competencies required, and 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. Consequently, measures of performance are not available to justify the large costs involved in conducting mass emergency management exercises. From this literature, questions arise regarding what
local government EOCs are currently doing to assess the training they are conducting and how they address implications such as the lack of performance measurement tools, and the lack of assessment methodology available. It is with these implications in mind that we use a survey to investigate what methods of training assessment local government emergency management offices use.

**Methodology**
A questionnaire-based survey was used to collect data about each organisation’s EOC activation in real emergencies and in training and simulations, as well as their general understanding of decision making used during the operation of an EOC.

An extensive literature review, and advice from experts in the field, guided the development of questions.

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. The participants selected were from New Zealand and North America, (British Columbia in Canada; and California, Colorado, and Washington State in the USA). All those who answered the questionnaire were either the emergency manager of the organisation or the emergency management advisor. They were instructed at the beginning of the questionnaire to answer the questions from the perspective of the organisation they worked for.

A total of 48 online completed questionnaires were received out of 96 organisations contacted, giving a rate of return of 50 per cent. This is a good rate of return for a survey and increases the generalisability of the findings, at least in relation to emergency managers in the countries surveyed. Table I lists the different types of organisations that responded to the study. In all, 36 North American government organisations were asked to participate in the study. Of these, 12 returned the questionnaire. Attempts were made to contact all regional, district, and city councils in New Zealand, via telephone calls. Of the 61 New Zealand councils successfully contacted, 36 completed the questionnaire, 17 agreed to participate but did not complete the questionnaire, 11 could not be contacted, while seven New Zealand local councils, particularly in the more isolated areas, indicated that all of their emergency management communication and information was performed through another level of government. A combination of closed and open-ended questions was used in the questionnaire resulting in analysis both qualitatively and quantitatively. For the free text open-ended responses thematic analysis (Braun and Clarke, 2006; Ryan and Bernard, 2000) was used to find patterns of meaning by using basic coding procedures.

<table>
<thead>
<tr>
<th>Type of organisation</th>
<th>Number of participating organisations</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada Municipality</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>USA State EM Office(^a)</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>USA County EM Office</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Canada Regional District</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>New Zealand Regional Council</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>New Zealand City/District Council</td>
<td>28</td>
<td>58</td>
</tr>
</tbody>
</table>

**Notes:** \(^a\)Also includes a FEMA department group called Region X; \(n = 48\)
Results

We focus here on the elements of the questionnaire that asked about the assessment of training and exercises, in particular the three questions:

1. Do you assess the training methods you use to determine if training was successful?
2. What methods of training assessment do you use?
3. Do you think the methods of assessment used gave an accurate account of how successful the training was?

In response to Question 1 all participating organisations indicated that they conducted some form of assessment as illustrated in Figure 2. In addition North American organisations “always assessed training” slightly more frequently than New Zealand organisations (Figure 3).

The open-ended training assessment methods question (Q2), solicited 22 different categories of response showing extensive variation in the approaches used (Table II). Most common was the use of participant evaluation or feedback, either by
Participant feedback/evaluation forms and 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
SWOTa 1
Annual training survey of participants 1
Monitoring of performance during activities 1
Post-exercise report circulated to EOC staff 1
Other 4

Note: aSWOT, strengths, weaknesses, opportunities, and threats. It is a framework for analysing the position of a business organisation or a product in the market

Source: Statt (2004)

Table II. Responses to Question 2
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, 63 per cent of participants thought that the methods of assessment they used “definitely” or “almost definitely” provided an accurate assessment of their training (Figure 4). Overall, there appears to be considerable variation in each participant’s interpretation and understanding of the assessment of training and exercises.

Discussion

Often included in the reviewed available assessment tools were suggestions for the use of exercises as a way of testing response plans (MCDEM, 2010). However, without the ability to accurately gauge the effectiveness of an exercise, its usefulness as a means of testing of plans and capabilities is unfounded. The assessment of training and exercises needs to establish with some certainty that these objectives have been achieved.

Information and guidelines supplied by national emergency management bodies such as MCDEM (2006, 2009) and FEMA (2010) emphasize the importance of a complete training cycle which includes comprehensively assessing all training or exercises. This is the objective of the assessment centre approach (Paton and Jackson, 2002). EOC evaluation could progress this level of evaluation by including more complex, real-time exercises that could emulate responses in real emergencies. Results presented in this paper suggest emergency managers are not taking full advantage of the few assessment resources that are available. Additionally, findings from this paper advocate for further research to provide an objective basis for new and innovative methods for assessing exercises.

Table III.

<table>
<thead>
<tr>
<th>Response (n = 48)</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: No not at all</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>31</td>
</tr>
<tr>
<td>4</td>
<td>36</td>
</tr>
<tr>
<td>5: Yes definitely</td>
<td>27</td>
</tr>
<tr>
<td>No answer</td>
<td>2</td>
</tr>
</tbody>
</table>

Figure 4.

Comparison of New Zealand and North America results showing how accurate participants thought the methods of assessment used were at determining how successful their training was.
From the review of available materials and guidelines, it is evident that little information exists specifically for the assessment of training in emergency management and even less for exercises based around EOC activation. While guidelines such as those provided by MCDEM (2009) and Fagel’s (2010) text represent helpful tools for emergency managers, academic research regarding the cost effectiveness of these guidelines for exercises in local government EOCs remains sparse and inconclusive. One implication of this is a need for the development of more rigorous research into emergency management training assessment methodology.

In addition, despite the existence of these resources 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 (Thomas et al., 2004). Others (e.g. Schaafstal et al., 2001) draw attention to the
lack of valid, reliable, and automated team performance measurement tools and the inability to assess and diagnose training effectiveness, with such problems being linked to the quality of the training and organisational needs analyses conducted and a failure to consider how organisational culture and practices influence outcomes (Paton et al., 2009). The results of the present study revealed that each individual organisation’s training and assessment programme was unique to that organisation, suggesting that processes are developed in ad hoc ways and are not making effective use of the relevant literature and ideas. In some cases not only had the monitoring and evaluation aspect of training been overlooked, but those that were using assessment methods were operating in blind faith that they were giving an accurate assessment of training. Therefore it is largely unknown how effective the training efforts of these local government organisations actually are.

Several implications flow from the analyses and review presented here. The ad hoc approach to the development of training design and evaluation by individual organisations has no guarantee of eliciting effective training programmes that can improve future response capability. There are many benefits to a comprehensive training and exercising programme, including the development of shared mental models across team members of what a response will involve (Endsley, 1994), and an increased understanding of each others’ knowledge, skills, roles, anticipated behaviour, and needs (Flin, 1996; Paton and Jackson, 2002). However, for organisations to maximise these benefits, they need to develop more sophisticated and evidence-based approaches to training needs analysis, design, and evaluation. This needs to become multi-level, encompassing person, team, organisational, and multi-organisation levels. Given the complexity of disaster response environments and the competencies and systems required, local government training should be based on correspondingly comprehensive techniques such as assessment centres to provide holistic training and evaluation. While more expensive, the benefits in terms of developing capabilities for unknown events more than offset the costs and even more so in terms of lives saved and losses reduced in the event of an actual disaster. The costs could also be offset by developing a national resource that individual governments could use.

References


Further reading
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About the authors
Helen Sinclair is currently living in Australia working for the State of Victoria as an Integrated Fire Management Planner (IFMP) for local and regional areas in the Eastern Metropolitan Melbourne, Victoria. This area was hit badly by large bushfires in 2009 (Black Saturday). Prior to this she worked at the Christchurch City Council gaining an understanding of local government and participating in regular EOC exercises. She is also trained in Urban Search and Rescue and high angle rope rescue and volunteers for the Victoria State Emergency Services.

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