

Observation and Evaluation of Maremoto II
Continuity of Operations Exercise
San Juan, Puerto Rico: Final Report

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Restatement of the Problem

The purpose of this activity was to gain firsthand experience with a FEMA conducted and graded continuity of operations (COOP) exercise on a large scale. With a new emphasis in Washington on the concept of resilience, as expressed through presidential directives and anticipated new policy initiatives, this was an opportunity to gain some insight as to how evaluators viewed efforts in this area. It allowed me to examine possible implications for COOP on the local and state level in view of this new national emphasis.

As an invited observer I attended and observed the exercise from the Emergency Operations Center (EOC) of the nation of Puerto Rico located in San Juan. The primary EOC is located in the headquarters building of the Puerto Rico Emergency Management Agency (PREMA) I observed and recorded activities associated with three major functions of the Puerto Rican emergency management structure and in particular how these functions were tested by the exercise.

The exercise began with a test of the national emergency communications system with a focus on electronic means of communications and associated backup systems. The national alert and notification system was tested as a second phase. This system is used to alert other government and private entities of a potential disaster situation and to directly communicate protective actions to members of the general public. Finally a reconstitution exercise was undertaken as the third phase to test how quickly government functions and basic services can be restored following a large scale disaster.

The exercise design consisted of a full-scale exercise focused on the testing of the Puerto Rico Continuity of Operations plan. The scenario premise was a major volcanic

eruption in the Canary Islands with a subsequent tidal wave crossing the Atlantic Ocean and impacting the Caribbean. This event narrative posited extensive damage to San Juan and its outlying areas. The stated exercise objectives focused on communications, alert and notification, relocation, and the ability to reconstitute the agency's essential functions.

The exercise took place on December 5-6, 2011. FEMA employees managed the Exercise Control Cell. December 5th activities were comprised of a communications test during the day and on the evening of December 5th; a testing of alert and notification capabilities and processes took place to kick off the exercise. This portion of the exercise required no physical relocating for exercise players. Participants were notified of the occurrence of a tidal wave and given agency-specific instructions. The third phase of the exercise began on December 6th at 9:00 a.m. and continued until 3:30 p.m. Participants were challenged with various major events and scenario injects, or site specific problems, addressing the reconstitution portion of their continuity plans.

The investigation focused on the continuity of operations system developed by the Caribbean Area Division of FEMA and the testing of that system through targeted exercise objectives.

Review of the Research Procedure

Using the standard exercise evaluation protocols as adopted by FEMA, known as the Homeland Security Exercise Evaluation Protocols (HSEEP), I observed and recorded actions and responses in the three key areas. This evaluation consisted of comparisons of planned options and activities with actual outcomes of exercise actions.

The resulting analysis by FEMA evaluators was the basis for a report and recommendations for improvement. Based on the “gap analysis” performed using my own observations and notes, and the final After Action Report and Improvement Plan, I compared the exercise objectives with the recorded outcomes and recommendations for improvement. The intent was to determine how the exercise objectives were used to test the system and how the outcomes were defined to specify system improvements. This “gap” identified and articulated in the report is a critical part of any exercise analysis when coupled with the recommendations for improvement to the system.

An extra dimension was added to my analysis by including the objectives and recommendations from the previous COOP exercise, Maremoto I, conducted in December 2010. This was done because of the premise of Maremoto II being a continuation of the first exercise in the exercise narrative. This allowed for a historical context while examining the second exercise and allowed an additional look at the system that emerged from the first evaluation.

Summary of Findings

With the key theme of exercise outcomes being an evaluation it would be useful to examine a typical exercise to examine how the results gave the evaluators indications of the degree of success in obtaining those outcomes. The scenario was predicated upon a major volcanic eruption in the Canary Islands with a subsequent tidal wave crossing the Atlantic Ocean and impacting the Caribbean. This simulated event would cause extensive damage to San Juan and its outlying areas. Objectives focused on communications, alert and notification, relocation, and the ability to reconstitute an

agency's essential functions. Maremoto I was the first step in this two part scenario with the following stated objectives:

1. Evaluate alert, notification and relocation procedures.
2. Evaluate the ability to continue essential functions.
3. Evaluate continuity facility operations.
4. Evaluate communications among interagency stakeholders and external partners.

During the drill, a phone tree was used for notification of employees who were key decision makers. It was recognized by players that employee contact information was in need of updating. The evaluation process yielded two important recommendations which would work to improve the efficiency of the system in place:

- Establish a routine procedure for updating contact information.
- Begin testing of alert and notification procedures on a regular basis.

The alert and notification process was successfully completed however, it was recognized by the agencies that adjustments within the system would be necessary.

Under objective two, evaluators began to look at the heart of the continuity process which is the ability through proper planning to continue essential functions. Participants had successfully identified mission essential functions (MEF) and had built their planning process around them. As with most planning elements, once they are put to the test some lessons learned begin to emerge. A few agencies recognized that, even though essential functions had been identified, actual implementation of tasking under these functions revealed a more in depth understanding of the process of defining mission essential functions and their possible incorporation into the continuity planning process was needed. Post exercise recommendations put forth by evaluators addressed the issue in several ways:

- Review the business impact analysis process in Federal Continuity Directive 2.
- Review personnel and resources necessary to support these functions.
- Review vital records identification and access in reference to essential functions.
- Test remote access to vital records with regard to IT requirements.

Here we see how observation in a single area – essential functions – yielded information useful in further refining not only the identification of essential functions but the continuation of these functions in specific areas.

Maremoto II in 2011 continued the tidal wave scenario again with the participation of 28 agencies in a full scale exercise. Scenario planners identified three objectives on which to concentrate in this extended exercise:

1. Evaluate alert notification and relocation procedures.
2. Evaluate reconstitution plans and procedures.
3. Build interagency relationships.

Examining objective two will again give some insight into the refinement which comes with testing critical elements of any plan. Participating agencies reported active efforts in building reconstitution plans but identified the need for more deliberate planning looking toward refinement of implementation processes. Here evaluators recommended:

- Review continuity plans with regard to the personnel and resources
- Review necessary personnel and resources to implement reconstitution.

Examination of the process led evaluators to stipulate in their finding that adequate resources needed became more essential than originally planned when testing the process was undertaken.

Conclusions

Through the emergence of specific outcomes in the San Juan exercises which have an effect on the total system we see the insight provided by an evaluative process and the underlying framework of thought behind the principle of evaluation. As per

HSEEP methodology, a task level analysis was performed to examine, "...specific, discrete actions...whose analysis can help entities target plans, equipment, and training resources to improve specific task performance".

In the San Juan example, the Maremoto I scenario listed alert and notification as an objective. This is a typical exercise objective since this function is always a key aspect of any plan initiation. The areas for improvement specified the establishment of procedures for more frequent updating of personnel listings and testing the alert and notification process on a regular basis. Sounds simple enough, however this shows an insight on the part of the system designers in recognizing a key leverage point within the system. Without successful alerting of personnel the plan can stumble in its initial phase. Fortifying a key task, or leverage point, to make it more robust strengthens the system design and takes a very positive step toward.

Another example can be seen in the Maremoto II exercise. A stated objective focused on the efficacy of reconstitution plans with regard to personnel and resources. Again we see the recognition of a key leverage point within the system. As is typical in an exercise situation, following procedures as specified and looking for the planned and expected outcomes gives the opportunity to evaluate the efficacy of the procedure. Both players and evaluators in Maremoto II realized that even though careful thought had been given to availability of resources, personnel in particular, when a disruptive situation arises which stresses the system, the needs can be greater than anticipated. Not only do we see good exercise design we see evaluators recognizing that a key leverage point needed to be re-examined with regard to assuring a greater availability of personnel to successfully complete reconstitution.

The simple idea of realizing that actions have consequences and raising our level of awareness of those consequences can have a huge positive effect on intended outcomes. Examining a plan, procedure, personnel or training with the idea of anticipating the position of each in an overall strategy to mitigate, prepare for, respond to or recover from a disruption can only lead to greater efficiency and levels of effectiveness when considering our goal of building community resilience.

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The Evaluation of Emergency Management Systems Through Exercises

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Abstract

The value of creating plans and exercising those plans to assure success in a response is a fundamental concept in emergency management. The prescribed steps or actions documented in a plan represent a thought process starting with the planner asking what if something happens. The planner then looks for the best strategy to prevent or lessen the impact of a disruptive event. Should that mitigation strategy fail, or be less than effective, the next step is a response to control the situation and begin to restore normalcy. Finally the post event strategy is developed building on those initial steps to recover from the disruption and move toward restoration. These actions, built upon comprehensive emergency management concepts, represent a system with the sole purpose assuring resiliency in a chaotic situation. Exercises are a way of testing the efficacy of that system and revealing gaps or weaknesses which can cause the collapse of the system and negate any efforts to achieve situational certainty.

Introduction

The one true purpose and ultimate goal of any plan is to assure, to whatever extent possible, the certainty of the outcome of a series of events. The planner is attempting to bring order from chaos by remote control. His weapon of choice is an artificial construct – a plan which guides the actions of participants, both willing and unwilling, toward a pre-determined outcome. The extent to which he achieves that outcome is subjective and often a matter of interpretation in which the planner determines the criteria for success. The idea that this construct, or system, can be used to control outcomes and that we can pre-determine, to some extent, how successfully this will occur is the basis for evaluation in the exercise of emergency plans of all types.

The Planning Process

In the world of emergency response, plans are a common tool used to aid those who respond to provide quick and effective action which can prevent the loss of life or lessen the impact of an unexpected event. Properly constructed, a plan gives an advantage by taking a proactive stance toward the elimination of the disruption of societal flow and its ongoing activities. By asking questions and looking for answers regarding possible causes of a disruption and then prescribing actions to counter that disruptive effect, the planner moves toward that ultimate goal of certainty. He does so by anticipating possible hazards and associated risks and exploring actions which can impede the onset of possibly dire consequences. Coombs (2012, p.5), in writing about this idea in terms of crisis management, states that it is, "...a set of factors designed to combat crises and to lessen the actual damage inflicted."

Consideration of these factors can lead us to an understanding of the planning process. In simple terms, "...planning provides the opportunity to anticipate conditions and systematically identify potential problems and workable solutions" (CPG 101, 2010, p. 1-3). The strategy often taken is to consider the outcome desired and work backward toward formulating a series of steps designed to reach that outcome and provide the workable solution needed. It is important to note that this process cannot take place in a vacuum. A successful plan is a collaborative effort involving people at all levels and, in particular, those who have an interest in the successful execution of a plan. These are the people who must bring, "... their resources and strengths to the table" (FEMA, IS 235, p. 2.6) to help with the formulation of a solution with a high level of merit.

When formulating a response and documenting the steps necessary to make that response effective and predictable it is worth noting that having the foresight to, as with any such activity, build the system with success in mind is but the first step in the process. Simply stating you will

do something when prompted by circumstances is not enough as an observation by Gay and Chenault (1973) points out, "...it is not simply a matter of being quick on your feet – that's how the non-professional responds to disaster. In a crisis, your effectiveness is often a result of what you have done the rest of the year" (p. iii). In other words, gathering your forces and resources to do battle against the hazard you have identified based on your analysis. The obvious next step is to try it out. Put the system in motion, practice the prescribed actions and look for the desired outcomes.

The Exercise Design Process

It thus becomes necessary to work through the steps in a trial scenario and perform an evaluation of those steps and, more importantly, the final outcome of the planning work that has been done. We can state that, "...the basic purpose of evaluation is to render judgments about the value of whatever is being evaluated" (Fitzpatrick, Sanders, & Worthen, 2004, p. 10). The authors further observe that this evaluation of any activity should be done by taking care to, "...identify and apply defensible criteria to determine its worth, merit or quality" (p. 10).

The principle of constant practice to achieve proficiency can be thought of as the heart of both the exercise cycle and the exercise design process. There are simple considerations that must be adhered to when designing an emergency exercise which ultimately lead to the successful completion of the prescribed steps and the determination of the whether the actions taken are appropriate and will give the desired outcome. Looking toward a goal and determining the ultimate outcome of pre-determined steps to achieve that goal guide the design of an exercise. Although an exercise is often looked at as an inconvenience by some, the testing of a system through an exercise is not only worth the time and effort but necessary. The FEMA exercise design course IS-235, which is part of their independent study series, states,

“Emergency exercises are worth the effort. Exercises identify areas that are proficient and those that need improvement. Lessons learned from exercises can be used to revise operational plans and provide a basis for training to improve proficiency in executing those plans” (p. 1).

The Exercise Evaluation Process

When dealing with planning for emergencies or disruptive incidents, this approach is certainly the philosophical basis for the testing and, ultimately the improvement, of all emergency plans. In the field of Emergency Management, it is widely accepted practice to use the exercise evaluation process developed by the Department of Homeland Security. In Volume III of the Homeland Security Exercise Evaluation Protocol (HSEEP III, 2007) the premise is advanced that the sole purpose for an exercise is improvement, “Exercise evaluation maintains a fundamental link to improvement planning because it assesses an entity’s performance in an exercise and identifies strengths and areas for improvement” (p. 1).

Defining evaluation is necessary to facilitate an understanding of the “evaluation process” as applied to exercises. Fitzpatrick, Sanders and Worthen (2004) state, in a simple observation concerning the process of evaluation that it is necessary, “...to identify and apply defensible criteria to determine...worth, merit or quality” (p. 10). Evaluation is generally distinguished by focusing in two different areas, formative and summative. Formative is generally focused on gathering information, “...for program improvement” (p. 16). Summative evaluation generally focuses on, “...judgments about the overall merit or worth of a program” (p. 18). Most evaluation of activities prompted by and evaluated within an exercise scenario are formative in nature and look for ways to improve the entire emergency management system being examined.

The Systems Approach to Exercise Evaluation

It is also useful to understand the idea of a system and how this type of thinking is valuable in determining the criteria needed for assessment. System thinking and analysis is a concept which is concerned not with individual parts of a mechanism or organization but its performance as a whole. The determining factor is their interrelationship, "System behavior comes about as a result of the interactions and relationships amongst the parts" (Edison, 2008, p. 5). Traditional analysis tends to break an organization down into individual components but Edison reminds us that this approach can be counterproductive. This direct relationship focus, Edison says, denies the evaluator a valuable context in which greater understanding beyond the normal linear thinking can be found, "Seeing interrelationships rather than linear cause-effect chains is an integral and mandatory part of systems thinking" (P. 14). This approach gives the evaluator a view of the activity or the organization in a greater context, "In addition, systems thinking acknowledges the strong interactions between the system components, and the emergent behaviors and unintended consequences that may result from these interactions" (p. 5). System thinking or system analysis is truly a holistic approach to evaluation.

Peter Senge is one the most well thought of and often quoted experts in the field of system theory and its use to examine everyday situations. In his renowned volume on systems theory and application, *The Fifth Discipline*, he teaches us that the examination of a scenario and determining areas of improvement can be reduced to the application of a simple principle he refers to as leverage. Senge tells us by way of definition that leverage is, "...seeing where actions and changes in structures can lead to significant enduring improvements." (p. 114). He refers to examination of situations in non-system terms as potentially damaging simply because the holistic approach is ignored and the examiner and potential problem solver focuses on symptoms and not real problems. Senge refers to these efforts to ameliorate symptoms as "low leverage"

actions. Close examination of a situation with an eye toward these enduring solutions which Senge champions he states the best solution, "...follows the principle of economy of means: where the best results come not from large scale efforts but from small well focused actions" (p. 114).

Senge's philosophy and systems thinking in general reminds us of the tale of a plant manager whose assembly line suddenly shut down. He called for a consultant to examine the technology and initiate a repair to restore the line to full operation. After a thorough examination, the consultant reached for a screwdriver, turned a single screw a half turn and immediately the line began running. He handed the manager a bill for \$10,000 dollars. The manager objected to having to pay such a large sum for the consultant to turn one screw. The consultant informed the manager it wasn't turning the screw which resulted in the charge, it was knowing which screw to turn. Thus we see Senge's idea of the well focused action in practice.

Examination of Real World Data: Maremoto I and II

With the key theme of exercise outcomes being an evaluation it would be useful to examine a typical exercise to examine how the results gave the evaluators indications of the degree of success in obtaining those outcomes. The focus this study will be two Continuity of Operations (COOP) exercises conducted by FEMA Region II with their Caribbean Area Division (CAD) based in San Juan, Puerto Rico. The first was conducted December 7-8, 2010 and the second December 5-8, 2011. The After Action Report for each of these exercises with results and recommendations will be examined. The full scale exercises were dubbed Maremoto I and Maremoto II. A total of 18 agencies participated in the full scale exercise with six agencies participating by conducting table top exercises for a total of 24 agencies involved in the overall exercise.

The scenario was predicated upon a major volcanic eruption in the Canary Islands with a subsequent tidal wave crossing the Atlantic Ocean and impacting the Caribbean. This simulated event would cause extensive damage to San Juan and its outlying areas. Objectives focused on communications, alert and notification, relocation, and the ability to reconstitute an agency's essential functions. Maremoto I was the first step in this two part scenario with the following stated objectives:

1. Evaluate alert, notification and relocation procedures.
2. Evaluate the ability to continue essential functions.
3. Evaluate continuity facility operations.
4. Evaluate communications among interagency stakeholders and external partners.

With the examination of these four objectives a great deal of data was gathered and key points in the individual COOP plans were able to be examined. Examining two of these will give us an example of useful information which leads to an analysis of a system constructed to accomplish a specific purpose. Under objective one, the alert and notification function was an area which yielded areas for improvement and associated recommendations. During the drill, a phone tree was used for notification of employees who were key decision makers. It was recognized by players that employee contact information was in need of updating. The evaluation process yielded two important recommendations which would work to improve the efficiency of the system in place:

- Establish a routine procedure for updating contact information.
- Begin testing of alert and notification procedures on a regular basis.

The alert and notification process was successfully completed however, it was recognized by the agencies that adjustments within the system would be necessary.

Under objective two, evaluators began to look at the heart of the continuity process which is

the ability through proper planning to continue essential functions. Participants had successfully identified mission essential functions (MEF) and had built their planning process around them. As with most planning elements, once they are put to the test some lessons learned begin to emerge. A few agencies recognized that, even though essential functions had been identified, actual implementation of tasking under these functions revealed a more in depth understanding of the process of defining mission essential functions and their possible incorporation into the continuity planning process was needed. Post exercise recommendations put forth by evaluators addressed the issue in several ways:

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Conclusions

Through the emergence of specific outcomes in the San Juan exercises which have an effect on the total system we see the insight provided by an evaluative process and the underlying framework of thought behind the principle of evaluation. As per HSEEP methodology, a task level analysis was performed to examine, “...specific, discrete actions...whose analysis can help entities target plans, equipment, and training resources to improve specific task performance” (HSEEP III, 2007, p. 2). By looking at procedures associated with these tasks the next level of evaluation in the HSEEP methodology – activity - is accomplished. Finally, examining and evaluating both tasking and procedures, allows evaluators to determine whether an entity can be said to have the capability to, “...respond to, or recover from the threat or hazard simulated in the exercise scenario” (p. 2). By evaluating capabilities as defined by HSEEP protocols, the overall capability of an emergency management system is determined. But more importantly we see how valuable it is to examine the connections between thoughts and actions and how they have an effect on whole.

Senge makes a couple of observations in *The Fifth Discipline* which we would do well to remember when building an emergency management system as well as looking at how it functions with regard to achieving its intended outcomes. First when discussing the structure of a system we tend to see this as an external constraint. However, Senge notes that often the interactions and relationships of humans are what controls the behavior of the system, “...structure includes how people make decisions and the “operating policies” whereby we

translate perceptions, goals, rules and norms into actions” (p. 40). His bottom line when examining a system is the principle of leverage. Senge states that this leverage can be observed and exerted by people in the system when they understand the circumstances, “...people often have potential leverage that they do not exercise because they focus only on their own decisions and ignore how their decision affect others” (p. 49).

In the San Juan example, the Maremoto I scenario listed alert and notification as an objective. This is a typical exercise objective since this function is always a key aspect of any plan initiation. The areas for improvement specified the establishment of procedures for more frequent updating of personnel listings and testing the alert and notification process on a regular basis. Sounds simple enough, however this shows an insight on the part of the system designers in recognizing a key leverage point within the system. Without successful alerting of personnel the plan can stumble in its initial phase. Fortifying a key task, or leverage point, to make it more robust strengthens the system design and takes a very positive step toward.

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